

APPENDIX F
ARCHAEOLOGICAL INVENTORY SURVEY (AIS)

DRAFT

ARCHAEOLOGICAL INVENTORY SURVEY
FOR THE PROPOSED
NĀ PUA MAKANI WIND PROJECT
IN THE AHUPUA'A OF KAHUKU, KEANA,
AND MĀLAEKAHANA, DISTRICT OF KO'OLAU LOA,
ISLAND OF O'AHU

[TMK (1) 5-6-005:018; (1) 5-6-006:018, 047, 051, 055;
and (1) 5-6-008:006]



Pacific Legacy: Exploring the past, informing the present, enriching the future.

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and (1) 5-6-008:006]**

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1.0 INTRODUCTION

Pacific Legacy, Inc., under contract to Nā Pua Makani Power Partners, LLC, a subsidiary of Champlin Hawai'i Wind Holdings, LLC, conducted an archaeological inventory survey (AIS) of the proposed site for the Na Pua Makani Wind Project [TMK (1) 5-6-005:018; (1) 5-6-006:018, 047, 051, 055; and (1) 5-6-008:006] in the *ahupua'a* of Kahuku, Keana and Mālaekahana, on the North Shore of the Island of O'ahu (Figure 1). An Archaeological Inventory Survey Plan (AISP) was produced prior to the initiation of fieldwork (Cleghorn 2014) and was accepted by the State Historic Preservation Division (LOG NO. 2014.02981, DOC NO. 1408NN02; see Appendix A).

The purpose of the AIS is to identify and document archaeological properties and cultural sites within a delineated area, gathering sufficient information to evaluate the significance of identified properties and sites (HAR §13-275). If significant cultural resources are identified during the survey, effect determinations are made and mitigation measures are recommended.

The current AIS presents the results of the pedestrian survey of the project area as defined as the Area of Potential Effect (APE). All construction related activities will be confined to the defined APE, as depicted in Figure 1. The current AIS also presents the results subsurface testing via backhoe trenching and hand excavated test units.

1.1 PROJECT AREA

The proposed Project is located in the Ko'olau Loa District, west of the town of Kahuku in the City and County of Honolulu and covers three *ahupua'a*: Kahuku, Keana, and Mālaekahana [TMK (1) 5-6-005:018; (1) 5-6-006:018, 047, 051, 055; and (1) 5-6-008:006]. It includes portions of two parcels which would be leased from the DLNR (approximately 234 acres [95 hectares]) and from the Mālaekahana Hui West, LLC (MHW) (approximately 452 acres [183 hectares]), as well as the use of non-leased State land for roadways into the project area.

The leased area plus the State-owned access measures approximately 707 acres (286 hectares). Within this leased area is the defined 464-acre (188 hectares) APE. All proposed Project activities would occur within this smaller approximately 464-acre (188 hectares) project area. This area constitutes the maximum footprint of the Project within which all ground disturbing activities would occur and which would be occupied by permanent Project facilities (Figure 1). The AIS was conducted in this 464-acre (188 hectares) APE.

The Project is located adjacent to Kamehameha Highway at its closest point, southwest of the Town of Kahuku. It is accessible via local roads off of Kamehameha Highway, and is located east of the existing Kahuku Wind Farm. Most of the land leased from MHW is under active small-scale commercial truck farming while the State land is largely undeveloped and forested foothills with some small leased farm lots.

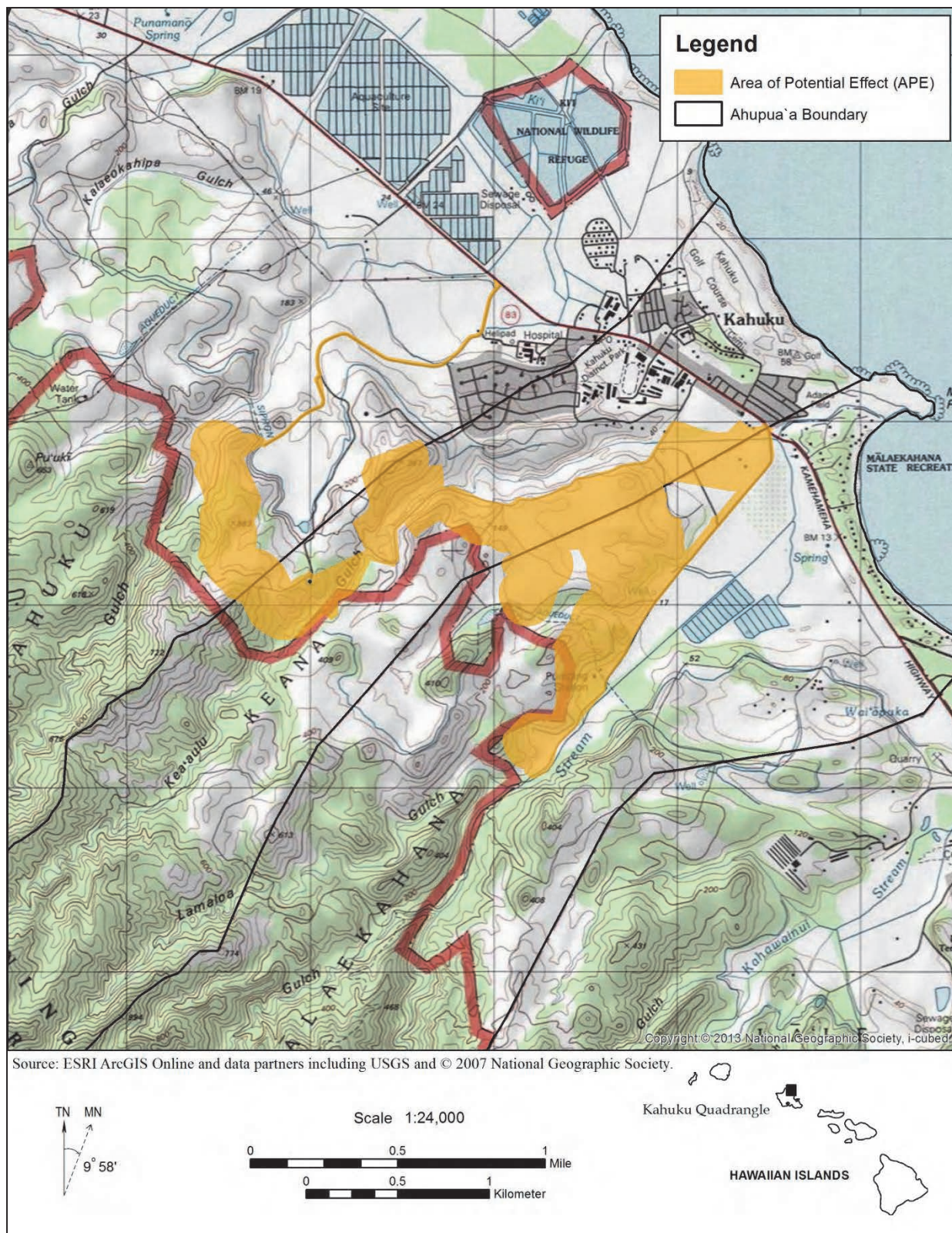


Figure 1. Project Area/APE on USGS map.

1.2 ENVIRONMENT

The dominant trade winds are out of the northeast and the average annual rainfall within this portion of Kahuku is less than 60 inches (1,524 mm) per year (Juvik and Juvik 1998: 56).

Vegetation within the project area is quite diverse and varied and consists of *kī* (*Cordyline fruticosa*), *hau* (*Hibiscus tiliaceus*), *kukui* (*Aleurites moluccana*), *kalo* (*Colocasia esculenta*), *liliko'i* (*Passiflora edulis*), *noni* (*Morinda citrifolia*), *ōlapa* (*Cheirodendron* spp.), *olonā* (*Touchardia latifolia*), *hala* (*pandanus tectorius*), *laua'e* (*Phymatosorus scolopendria*), *mango* (*Mangifera* spp.), *coconut* (*Cocos nucifera*), *eucalyptus* (*Eucalyptus* spp.), *shower tree* (*Cassia* spp.), *banana* (*Musa* sp.), *koa haole* (*Leucaena leucocephala*), *guava* (*Psidium guajava*), *strawberry guava* (*Psidium cattleianum*), *'ulu* (breadfruit; *Artocarpus altilis*), *jackfruit* (*Artocarpus heterophyllus*), *tamarind* (*Tamarindus indica*), *java plum* (*Syzygium cumini*), *Christmasberry* (*Schinus terebinthifolius*), *iron wood* (*Casuarina equisetifolia*), *century plant* (*Agave Americana* sp.), *sugarcane* (*Saccharum officinarum*), *banyan* (*Ficus* spp.), *bamboo* (*Schizostachyum glaucifolium*), and various grasses and ferns. Also present are numerous other cultivated commercial crops and herbs on the active farm lots.

1.2.1 Soils

Soils within the project area are comprised of the Coral Outcrop, Haleiwa Series, Kaena Series, Kawaihapai Series, Lahaina Series, Mokuleia Series, Paumalu Series, and Waialua Series.

Coral Outcrop

Coral outcrop (CR) consists of coral or cemented calcareous sand on the island of Oahu. The coral reefs formed in shallow ocean water during the time the ocean stand was at a higher level. Small areas of coral outcrop are exposed on the ocean shore, on the coastal plains, and at the foot of the uplands. Elevations range from sea level to approximately 100 feet. The annual rainfall amounts to 18 to 40 inches. Coral outcrop is geophysically associated with Jaucas, Keaau, and Mokuleia soils... This land type is used for military installations, quarries, and urban development. Vegetation is sparse and consists of kiawe, koa haole, and fingergrass (Foote et al. 1972:29).

Haleiwa Series

This series consists of well-drained soils on fans and drainageways along the coastal plains. These soils are on the islands of Oahu and Molokai. They developed in alluvium derived from basic igneous material. They are nearly level to strongly sloping. Elevations range from sea level to 250 feet. The annual rainfall amounts to 30 to 60 inches, most of which occurs between November and April... Haleiwa soils are geographically associated with Waialua and Kawaihapai soils on Oahu and Kalaupapa soils on Molokai... These soils are used for sugarcane, truck crops, and pasture. The natural vegetation consists of koa haole, lantana, guava, Christmasberry, Bermuda grass, and fingergrass (Foote et al. 1972:33).

Haleiwa silty clay, 2 to 6 percent slopes (HeB). - On this soil, the runoff is slow and the erosion hazard is slight. This soil is used for sugarcane, pineapple, and truck crops (Foote et al. 1972:34).

Kaena Series

This series consists of very deep, poorly drained soils on alluvial fans and talus slopes on the islands of Oahu and Kauai. These soils developed in alluvium and colluviums from

basic igneous material. They are gently sloping to steep and are commonly stony. Elevations range from 50 to 150 feet. The annual rainfall amounts to 30 to 45 inches, most of which occurs between November and April...Kaena soils are geographically associated the Honouliuli, Lualualei, and Waialua soils...These soils are used for sugarcane, truck crops, pasture, and homesites. The natural vegetation consists of kiawe, klu, lantana, koa haole, and fingergrass (Foote et al. 1972:49).

Kaena clay, 2 to 6 percent slopes (KaB). - This soil has a profile like that of Kaena stony clay, 6 to 12 percent slopes, except that there are few or no stones in the surface layer. Runoff is slow, and the erosion hazard is slight. This soil is used for sugarcane, truck crops, pasture, and urban development (Foote et al. 1972:50).

Kaena clay, 6 to 12 percent slopes (KaC). - This soil has a profile like that of Kaena stony clay, 6 to 12 percent slopes, except that there are few or no stones in the surface layer...This soil is used for sugarcane and pasture (Foote et al 1972:50).

Kawaihapai Series

This series consists of well-drained soils in drainageways and on alluvial fans on the coastal plains on the islands of Oahu and Molokai. These soils formed in alluvium derived from basic igneous rock in humid uplands. They are nearly level to moderately sloping. Elevations range from nearly sea level to 300 feet. The annual rainfall amounts to 30 to 50 inches...Kawaihapai soils are geographically associated with Haleiwa, Waialua, and Jaucas soils. These soils are used for sugarcane, truck crops, and pasture. The natural vegetation consists of kiawe, koa haole, lantana, and Bermudagrass (Foote et al. 1972:63-64).

Kawaihapai clay loam, 0 to 2 percent slopes (KIA). - This soil occupies smooth slopes...The natural vegetation consists of guava, honohono, kukui, and hala...Permeability is moderate. Runoff is slow, and the erosion hazard is no more slight...This soil is used for sugarcane, truck crops, pasture, and orchards (Foote et al. 1972:64).

Lahaina Series

This series consists of well-drained soils on uplands on the islands of Lanai, Maui, Molokai, and Oahu. These soils developed in material weathered from basic igneous rock. They are nearly level to steep. Elevations range from 10 to 1,500 feet. The annual rainfall amounts to 20 to 35 inches, most of which occurs in fall and winter...Lahaina soils are geographically associated with Helemano, Hoolehua, Kahana, Molokai, Pamoia, and Wahiawa soils. These soils are used for sugarcane and pineapple (Foote et al. 1972:78).

Lahaina silty clay, 3 to 7 percent slopes (LaB). - This soil is on smooth uplands...Cobblestones are common on the surface in a few places. In some places near the coastal plains, the profile contains fragments of coral, stone gravel, or sand...Permeability is moderate. Runoff is slow, and the erosion hazard is slight (Foote et al. 1972:78).

Lahaina silty clay, 7 to 15 percent slopes (LaC). - On this soil runoff is medium and the erosion hazard is moderate...This soil is used for sugarcane and pineapple. Small acreages are used for truck crops, pasture, and wildlife habitat (Foote et al. 1972:79).

Mokuleia Series

This series consists of well-drained soils along the coastal plains on the islands of Oahu and Kauai. These soils formed in recent alluvium deposited over coral sand. They are shallow to nearly sea level. Elevations range from nearly sea level to 100 feet. The annual rainfall amounts to 15 to 40 inches on Oahu...Mokuleia soils are geographically associated with Hanalei, Jaucas, and Keaau soils (Foote et al. 1972:95).

Mokuleia clay loam (Mt). - This soil occurs as small areas on the coastal plains...Permeability is moderate in the surface layer and rapid in the subsoil. Runoff is very slow, and the erosion hazard is more than slight...This soil is used for sugarcane, truck crops, and pasture (Foote et al. 1972:95).

Paumalu Series

This series consists of well-drained silty clay soils on uplands in the northern part of Oahu. These soils developed in old alluvium and colluviums derived from basic igneous rock. They are gently sloping to very steep. Elevations range from 700 to 1,000 feet. The annual rainfall amount to 50 to 70 inches and is well distributed throughout the year. Paumalu soils are geographically associated with Kemoo soils, near Kahuku. These soils are used for pasture and sugarcane. The natural vegetation consists of guava, waiwe, Christmasberry, ricegrass, and carpetgrass (Foote et al. 1972:110).

Paumalu silty clay, 3 to 8 percent slopes (PeB). - On this soil, runoff is slow and the erosion hazard is slight. Workability is easy. This soil is used for sugarcane and pasture (Foote et al. 1972:111).

Paumalu silty clay, 8 to 15 percent slopes (PeC). - On this soil, runoff is slow to medium and the erosion hazard is slight to moderate. Workability is slightly difficult. This soil is used for sugarcane and pasture (Foote et al. 1972:111).

Paumalu-Badland complex (PZ). - In this complex Paumalu soils make up 40 to 80 percent of the acreage. The slope is 10 to 70 percent...Runoff is medium to rapid, and the erosion hazard is moderate to severe...Badland consists of nearly barren land that has remained after the Paumalu soils were removed by wind and water erosion. Runoff is rapid, and the erosion hazard is very severe. This complex is used for pasture and military purposes (Foote et al. 1972:111).

Waialua Series

This series consists of moderately well drained soils on alluvial fans on the island of Oahu. These soils developed in alluvium weathered from basic igneous rock. They are nearly level to steep. Elevations range from 10 to 100 feet. Annual rainfall amounts to 25 to 50 inches; most of it occurs between November and April. Waialua soils are geographically associated with Honouliuli, Kaena, and Kawaihapai soils. These soils are used for sugarcane, truck crops, orchards, and pasture. The natural vegetation is swollen fingergrass, koa haole, and uhaloa (Foote et al. 1972:128).

Waialua silty clay, 0 to 3 percent slopes (WkA). - This soil is on smooth coastal plains...Permeability is moderate. Runoff is slow, and the erosion hazard is no more than slight...This soil is used for sugarcane, truck crops, and pasture (Foote et al. 1972:128).

Waialua silty clay, 3 to 8 percent slopes (WkB). - On this soil, runoff is slow and the erosion hazard is slight. This soil is used for sugarcane, truck crops and pasture (Foote et al. 1972:128).

2.0 HISTORIC BACKGROUND

2.1 TRADITIONAL PERIOD

At the time of European contact, the Kahuku area was a rich cultivated landscape. Lieutenant James King remarked: “nothing can exceed the verdure of the hills, the variety of wood and lawn, and the rich cultivated valleys which the whole face of the country displayed” (Cook 1784:115, as cited in Handy and Handy 1991:462). This comment indicates the wealth of the Kahuku region. However, a short time later, the explorer George Vancouver paints a picture of an area in great decline:

“Our examination confirmed the remark of Capt. King excepting that in point of cultivation or fertility, the country did not appear in so flourishing a state, nor to be so numerously inhabited, as he represented at that time, occasioned most probably by the constant hostilities that existed since that period” (Vancouver 1798 vol. 3:71, as cited in Handy and Handy 1991:462).

Handy and Handy write of the abandoned terraces which once dotted the Kahuku landscape and the population decline:

In 1833 Hall (1839) observed at Kahuku that “much taro land now lies waste because the diminished population of the district does not require its cultivation” (Handy and Handy 1991:462).

Based upon these descriptions, it is evident that the Kahuku area was once fairly densely inhabited and that agricultural activities flourished. However, after European contact it appears that there was a marked population decline with an associated decrease in agricultural activity.

2.2 HISTORIC PERIOD

Ranching in the Kahuku area began in the 1850s when the Kahuku Ranch was established on land purchased from Kamehameha III (Korn 1958: 211-212). The cattle and sheep ranch grew and soon the once rich vegetation of Kahuku began to disappear, as the result of free-range overgrazing (Stride et al. 2003:16). This took a toll on the natural resources, the small unprotected family gardens, and the native population. “At the same time the *hala* forests began to disappear, the Hawaiian population also began to disappear” (Stride et al. 2003:16). Presumably the population continued to decline between the 1830s and the 1850s.

By the 1890s, James Campbell had control of a large portion of the Kahuku tract which laid the groundwork for the creation of the Kahuku Plantation (Stride et al. 2003). This was the start of large-scale commercial agriculture that altered the landscaped of Kahuku with agriculture and a railroad segment that changed the landscape and redefined the region.

Much of the uplands above Kahuku Village were once planted in sugar cane and pineapple. These fields were established wherever possible except on steep hillsides and on the crests of ridges and knolls (Stride et al. 2003:5).

The plantation continued to expand into the 1930s when Japanese, Filipino, and Portuguese worked the fields (Stride et al. 2003:20). The plantation was responsible for shaping the town of Kahuku and the life of its workers by introducing “concrete stoves for laborer’s cottages and sanitation drains that were used as models for other plantations...Kahuku...introduced the first plantation day nursery and high school...baseball diamond, the first golf course...” (Stride et al. 2003:22). The growth quickly slowed in 1955 when the last of the locomotives hauling sugarcane stopped. In 1971, the Kahuku Plantation closed (Stride et al. 2003:23).

3.0 ARCHIVAL RESEARCH SUMMARY

This section is a synthesis of records documenting traditional and mythological accounts associated with the Nā Pua Makani Wind Project lands and surrounding areas as well as Historical documentation and archaeological record. The names and locations of *ahupua'a* used in this section of the report are largely derived from information in the *O'ahu Pre-Māhele Moku and Ahupua'a* map created by Kamehameha School's Hawaiian Studies Institute in 1987 (Figure 2) and *Place Names of Hawai'i* (Pukui et al. 1974). According to this map, the project area spans an area that incorporates inland portions of three *ahupua'a*: Kahuku, Keana, and Mālaekahana.

The subject *ahupua'a* are located within the district, or *moku*, of Ko'olau Loa, within which the Nā Pua Makani Wind Project lands are located, extends from the *ahupua'a* of Ka'a'awa on the central east side of O'ahu, rounding the northern tip of the island to Pūpūkea. In *Sites of O'ahu* (Sterling and Summers 1978:142), writer for *Ka Nūpepa Kuokoa*, S. M. Kauī, holds that Ko'olau Loa District stretches from Keahu-o-Hapu'u to the Point of Ka'ō'io, which is between Kualoa and Ka'a'awa (Figure 3). The name of this district, spelt as "Ko'olau Loa" by Pukui et al. (1974:117), literally translates to "long Ko'olau" (ibid.), Ko'olau being the windward mountain range that runs along the entire eastern side of O'ahu.

3.1 PRE-EUROPEAN CONTACT CULTURAL LANDSCAPE

In general, traditional and mythological accounts from pre-European contact Hawai'i represent a belief system explaining all aspects of the physical universe and spirit realm, the origin and nature of mankind, and the history of the community, as well as collectively remembering the heroic adventures, exceptional feats, and cautionary tales of their ancestors. These traditional accounts are contained in the hearts and minds of cultural practitioners and customarily passed on through oration. Throughout the passage of time, figures transcend earthly legends into the cosmic, divine, and fearsome realm of the gods that is only separated from the mundane world by a thin veil and has the power to interact with and cast influence on the mundane. To this day, a sense of respect, reverence, and fear is still held on to by cultural practitioners and those indoctrinated in these traditions, as it is believed that the very landscape is imbued with the *mana* (life force or supernatural energy) of the divine.

3.1.1 The Natural World

Conversely, the mundane, or lifeways and land use, of pre-European contact Hawaiians are also part of the cultural landscape and are interpreted through archaeological research in conjunction with oral histories and recorded traditional accounts. Handy and Handy (1991) provide some commentary on general land use patterns of ancient Hawaiians that are applicable to the general Kahuku area. As marine resources represent the main source of protein in the traditional Hawaiian diet, Handy and Handy (ibid.) suggest that upland agriculture was typically preceded by or correlated with the productiveness of an area's coastal fishing grounds. *Mauka* lands were intensively developed in areas where coastal fishing

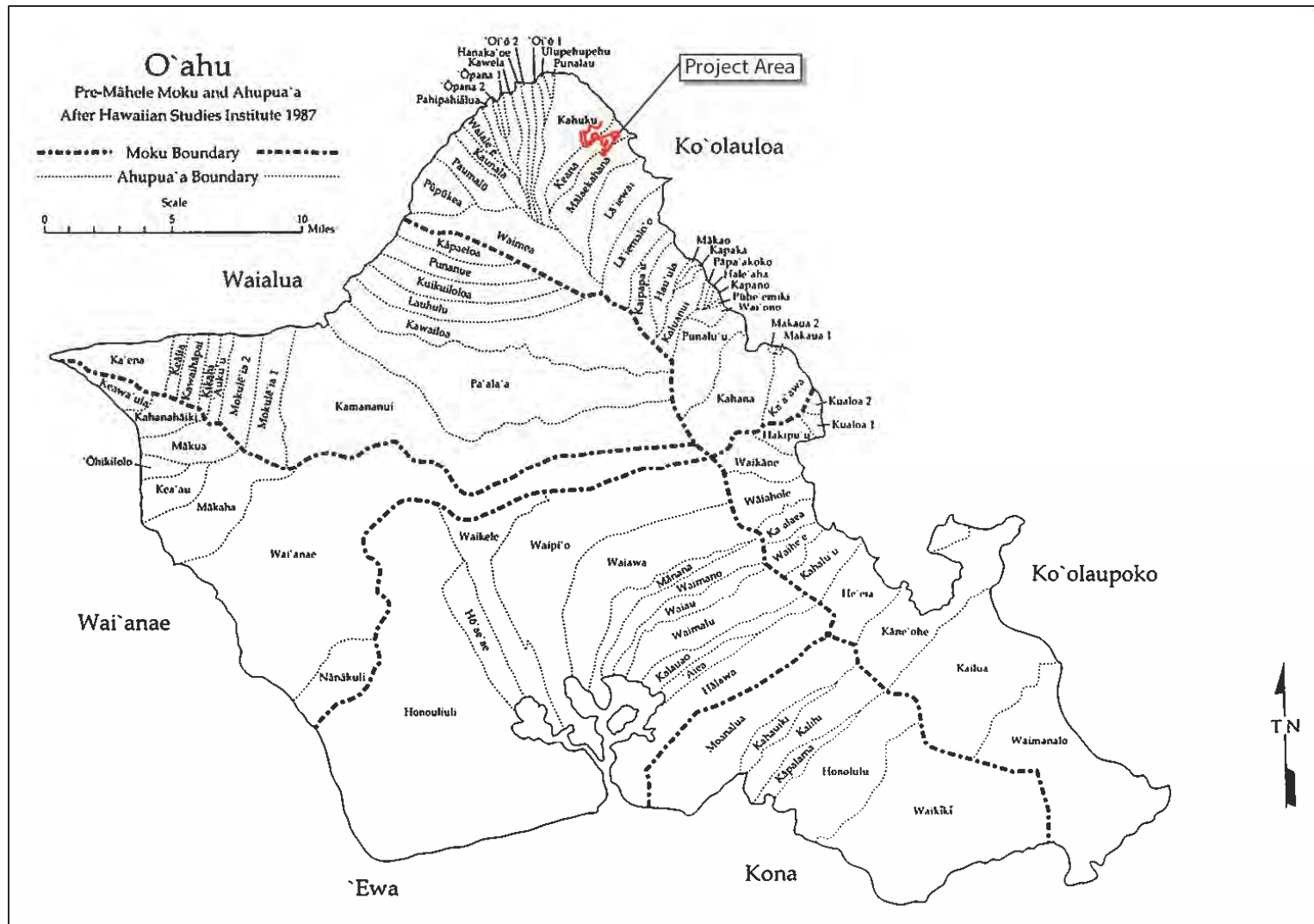


Figure 2. Map of O'ahu, showing approximate location of project area in relation to pre-Māhele moku and ahupua'a (courtesy of Hawaiian Studies Institute 1987).

grounds were easily accessed. On O‘ahu, sweet potatoes were cultivated to supplement taro, the main starch of the Hawaiian diet, when soils were too sandy or dry to grow taro. Further, sweet potato cultivation, typically grown inland, appeared to correlate with high population densities in general.

Traditionally in Hawai‘i, environmental zones were perceived and determined by various natural features and resource criteria (Handy and Handy 1991:54-56). . The following is a summary of Handy and Handy (1991:54-56) description of the terrestrial environmental zones:

1. *Ko Kaha Kai*: Land by the sea, or coastal region providing marine resources (fish and other marine animals, seaweed and salt). “Kaha was a special term applied to areas facing the shore but not favorable for planting.
2. *Kula*: The plains or sloping lands (without trees) above the coastal region.
 - a) *Kula kai*: Seaward plains.
 - b) *Kula uka*: Inland or upland slopes (towards the mountains).
3. *Kahawai*: The place (having) water. The area beyond or intersecting the *kula* lands. This upland zone provided suitable agricultural sites and abundant naturally occurring resources which were used for religious, domestic, and economic purposes.
4. *Wao*: Wilderness
 - a) *Wao kanaka*: Region of man. Lower forest, providing hard wood (*koa*) for spears, utensils, and logs for canoes; *lau hala* (pandanus leaves) for thatch and mats; *māmaki* for bark cloth (*tapa*); *kukui* (candlenut) for oil; wild yams, roots, and sandalwood.
 - b) *Wao akua*: Region of deities. ...remote, awesome, seldom penetrated, source of supernatural influences, both evil and beneficent.
 - c) *Wao ma‘ukele*: Rain forest. Here grew giant trees and tree ferns (*‘ama‘u*) under almost perpetual cloud and rain.

The Nā Pua Makani Wind Project lands are predominantly located in the following environmental zones: *Kula uka* and *Wao kanaka*. Numerous traditional accounts, *mo‘olelo*, and Land Claim Native Testimonies allude to the cultivation of lands, varying in intensity, from *kula* to *wao* (Hall 1839; Fornander 1917; Thrum 1919; Handy 1940; Handy and Handy 1991; Sterling and Summers 1978; Silva 1984; Maly and Maly 2003; Hammatt 2008; Vogeler et al. 2011).

3.1.2 Life in the Ahupua‘a

With great variations of geological features, each *ahupua‘a* had its own dynamic resource management system that was based on traditional customs upheld by the *kapu* system, or ancient religious law. The *ahupua‘a* typically extended from the coast to the nearest mountain top or ridge and resources from the land and sea were equally distributed within the *ahupua‘a*. Lyons (1875) describes the geographic nature of the *ahupua‘a* as well as the movement of resources from mountain to sea and vice versa, stating:

The Ahupuaa ran from the sea to the mountain, theoretically. That is to say the central idea of the Hawaiian division of land was emphatically central, or rather radial. Hawaiian life vibrated from *uka*, mountain, whence came wood, kapa, for clothing, olona, for fish line, ti-leaf for wrapping paper, *ie* for rattan lashing, wild birds for food, to the *kai*, sea, whence came *ia*, fish, and all connected therewith.

Mauka and makai therefore fundamental ideas to the native of an island (Lyons 1875: 104).

The *ahupua'a* was also an important socio-political unit in the pre-Contact era, each unit with its own hierarchy. Kirch (1985) holds that *moku* were independent chiefdoms, divided into a number of radial land divisions, referred to as *ahupua'a*, with subdivisions of 'ili and mo'o within. According to Kirch (1985),

Each *ahupua'a* was controlled by a lesser chief, who in turn appointed one or more stewards to oversee production, organize work parties, collect tribute, and in other ways represent the chief. *Ahupua'a* were economically self-sufficient to some degree, although differences in the local resource base (agricultural land, water resources, stone for tools, and so on) resulted in differences in the production patterns of individual land sections. Within the *ahupua'a*, there were yet smaller sections and divisions, especially the 'ili and mo'o, which were held and worked by extended households or groups of commoners.

According to Handy and Handy (1991), for the purpose of taxation, the chief political subdivision of the pre-Contact era was the *ahupua'a*, which was generally under the management of the *konohiki* (steward or caretaker). The term *ahupua'a* itself is derived from the fact that each coastal *ahupua'a* boundary was marked with an altar (*ahu*) which held a carved wooden effigy of a pig (*pua'a*) head during the Makahiki festival, when harvest tributes (taxes) were offered to the god of rain. Handy and Handy (1991) refer to the lower chief who represented the *ahupua'a* as *ali'i 'ai ahupua'a*, which translates to English as "chief who eats the *ahupua'a*" (1991:48). Yet, according to Malo (1951:142) the *konohiki* was tasked with collecting levies from the *maka'āinana* (commoners; literally "people that attend the land") of the *ahupua'a* for the king and of the *ali'i 'ai ahupua'a*. The word *konohiki* is defined by Pukui and Elbert (1986) as the, "Headman of an *ahupua'a* land division under the chief; land or fishing rights under control of the *konohiki*; such rights are sometimes called *konohiki* rights" (1986:166). Thrum (1924) wrote that the *konohiki* was a local representative or steward of the landlord owner whose privileges and duties were, "...practically those which go with that position in any land and in common with his brethren today in Russia or Ireland he had his failings and was not always popular among his fellows..." (1924:60).

Handy and Handy (1991) liken the *ahupua'a* tenure system to western share cropping, where "sharing between the chief and tenant was comprehensive and reciprocal in benefits" (1991:48). Kirch and Sahlins (1992) delve further into the social dynamics of the *ahupua'a* in their historical ethnography, *Anahulu: The Anthropology of History in the Kingdom of Hawai'i, Volume One*. Kirch and Sahlins (1992:17) state the following about variations in land use in the ancient *ahupua'a*:

Economically more highly valued, the coastal areas were also generally preferred for chiefly residence. Here were the most extensive wet taro lands, offshore and onshore fish ponds, as well as access to the sea and the fishing and surfing that in Hawaii were sports of kings. Still, the uplands were also necessary for the Hawaiian existence. In addition, to things mentioned by Lyons, people were specifically dependent on the uplands for the timber and thatching of their houses; the materials for their canoes, bowls, weapons, images, agricultural tools, and other objects using hardwoods; rope, line, fishnetting; lighting (from

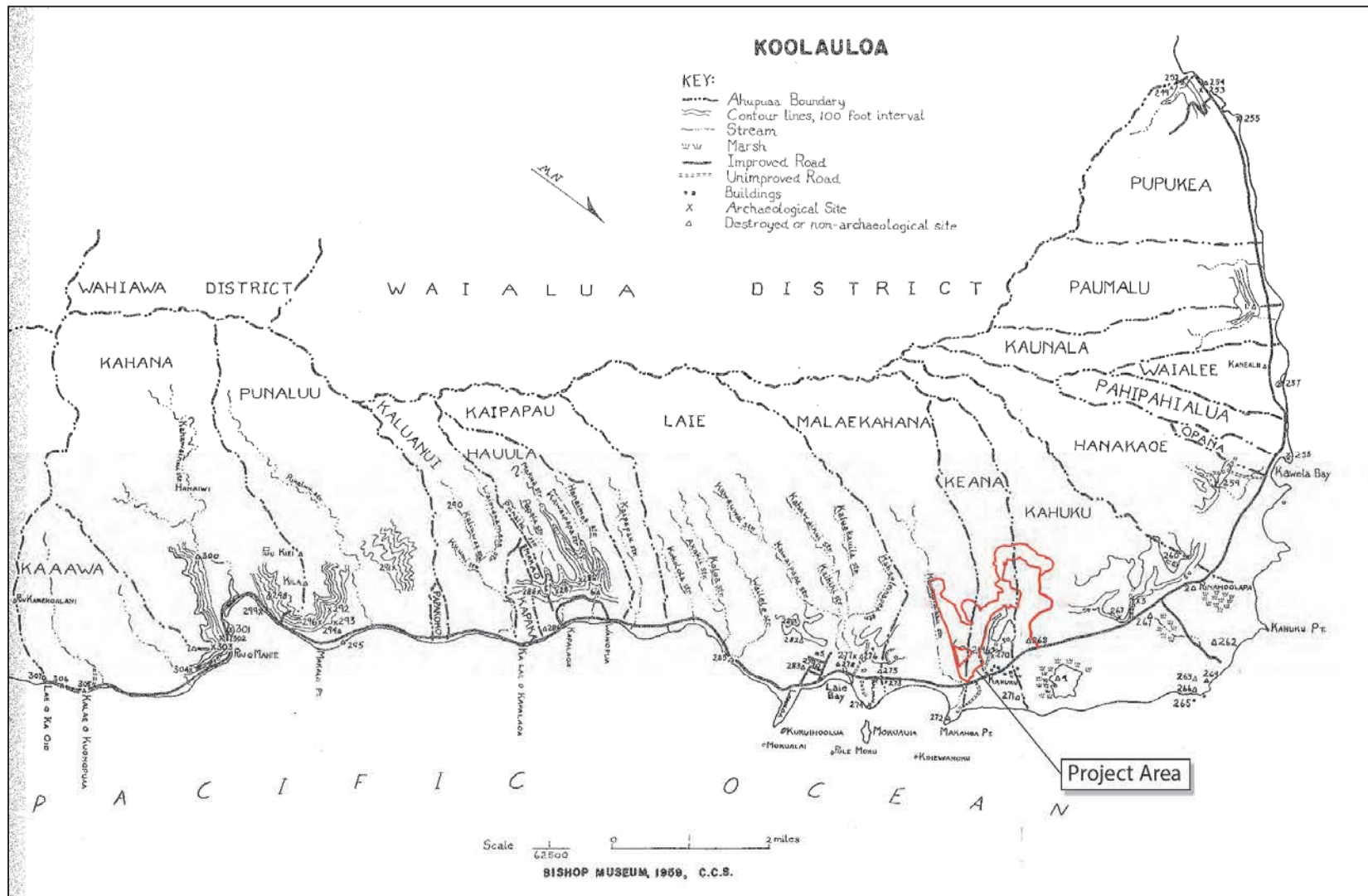


Figure 3. Sterling and Summers (1978) map of Ko'olau Loa showing approximate location of project area.

candlenuts); pasture for domestic animals (in the nineteenth century); various fruit trees; and more (Kirch and Sahlins 1992:19).

Thus, resources needed for daily life were best grown in or collected from the habitats that they were best suited for and likely distributed, through trade, gifting, or taxes, from *mauka* to *makai* or vice versa within the *ahupua'a*. Further evidence of this is found in the archaeological record, where most upland habitation features in the area contain significant amounts of marine shell and fish bone in midden deposits, which suggests that people inhabiting the *mauka* areas of the *ahupua'a* had a steady diet of marine resources (Jensen 1989; Williams and Patolo 1998).

3.1.3 Traditional Hawaiian Land Divisions

The pre-Contact economy of the Hawaiian Islands was based upon agricultural production that worked within a tiered system of land divisions (Lyons 1875; Malo 1951; Handy and Handy 1991; Kirch 1985; AKAC 2010). In 1875, Curtis J. Lyons, the distinguished surveyor published an article in *The Islander* on land issues, which identified the *ahupua'a* as the principal subdivision in a *moku* (district). In this article, he states:

...Its name is derived from the *Ahu* or altar; (literally, pile, *kuahu* being the specific term for altar) which was erected at the point where the boundary of the land was intersected by the main road, *alaloa*, which circumferenced each of the islands. Upon this altar at the annual progress of the *akua makahiki* (year god) was deposited the tax paid by the land whose boundary it marked, and also an image of a hog, *puaa*, carved out of kukui wood and stained with red ochre. How long this was left on the altar, I do not know, but from this came the name, *ahupua'a*, of the pile of stones, which title was also given to the division of land marked thereby...(Lyons 1875:103-104).

The islands are divided into several sections called *moku* (districts), in which are particular subdivisions referred to as *'okana* (a portion) or *kalana* (a division) (Lyons 1868:67-68; Malo 1951:16-17). According to Curtis J. Lyons (1868) in *Nūpepa Kuakoa*, these units are further divided into *ahupua'a*, which are the main units of traditional Hawaiian land division. Within *ahupua'a* are *'ili*, followed by *'ili pa'a*, *'ili kūpono*, *'ili lele*, *lele*, *mo'o*, *mo'o 'āina*, *paukū*, *kīhāpai*, *kō'ele*, and *kuleana* (Pukui and Elbert 1986). However, in some cases, the *'ili kūpono* or *kū* were a type of sovereign *'ili* within an *ahupua'a* that were not made to pay tribute to the chief (Thrum 1890:106). Within the *paukū* are dry land patches, referred to as *kō'ele*, *hakuone*, and *kuakua* (cultivated specifically for the chief; listed from smallest to largest). In general, high elevations or mountains are called *mauna*, but mountains or mountain summits located centrally on the island are termed *kuahiwi*, while the peaks or ridges on top of the *kuahiwi* are called *kualono*. In 1868, Lyons continues to describe the geography of the typical *ahupua'a* as well as the Hawaiian names for these geological features, stating:

The place where trees are small below the fern belt is termed *kuahea* (hillock section); below it is the *wao* (wild place), also called *waonahele* (wilderness) and *wao eiwa* (ninth wilderness). The place where trees grew taller below the *wao eiwa* is the *wao maukele*, and a little below it again is the *waoakua* (spirit region) ; next below that is where voices increase and, hence, called *wao kanaka* (people's sphere), because there the people cultivate food. Below that is *apaa*, and next is *ilima* (where this plant of the *Sida* genus is found), and below it is *pahu* (stake or land mark). Below *pahu* is *kula* (open country) adjoining habitations,

and seaward of the village is the shore, where it joins the sea. Such was the island divisions by the ancient people of Hawaii.

...Places that stand high up in this and that locality are called puu (mounds or peaks) ; if they stand in a row they are a lalani puu, or pae puu (a line or range of peaks or hills)...High places of the earth lying narrow is a lapa (ridge), or kua lapa (shoulder ridge). If the ridges are many they are called olapalapa (rough protuberances). Deep places lying lengthwise are called kahawai, awawa, or owawa (streams, valleys or ditches). Lengthy, solitary places are called alanui (roads), and kuamoo (paths), and if it continues circuiting the island it is a highway. In places where the path is steep it is called piina or hoopiina (ascending path), kooku (hill slope), and auku (up hill road). Descending paths are termed ihona, alu, kalua, and hooihona, and the place where men would rest is oioina (a resting place). Places where water flows continually are streams (kahawai). Inland places are kumu (source) and seaward places are called nuku (point or outlet). Where water is led to places of cultivation, that is called an auwai (watercourse); where the water joins the sea is a muliwai (river) ; waters borne within the land are lokos (lakes or ponds) (C.J. Lyons 1868 as cited in Thrum 1921:67-68).

Perhaps the ancient Hawaiians created names for an array of topographical features and slight variations within the *ahupua'a* as a way to help keep the dynamic *mauka-makai* economic structure organized.

The names of the three *ahupua'a*, Kahuku, Keana, and Mālaekahana, in which the project area are located within each have traditional meanings. According to Pukui et al. (1974:67) Kahuku literally translates as “the projection” and is the name of a village, land division, northernmost point, golf course, ranch, schools, forest reserve, as well as surfing beach on O‘ahu. Keana literally translates into English as “the cave,” according to Clark (2002:177), perhaps due to the fact that one of its most prominent sites is an ancient rock shelter (Site No. -270) known as Keana Cave (McAllister 1933:233; Sterling and Summers 1978:154). Mālaekahana Ahupua'a, which is named after the mother of legendary figure, Lā'ie-i-ka-wai, is also the name of the large bay and stream found within the land division (Pukui et al. 1974:143).

3.1.4 Traditional Names of Topographical Features

The Nā Pua Makani Wind Project lands are within Kahuku, Keana, and Mālaekahana Ahupua'a. The great majority of the project area is within the *kula* (plains/fields) and *wao* (upland) areas of Keana and Mālaekahana Ahupua'a. Several culturally significant landmarks and noted topographical are located in and around the Nā Pua Makani Wind Project lands. These landmarks possessed Hawaiian names in the pre-Contact era, which were based on distinguishing characteristics, *mo'olelo*, or traditional use of the area. These traditional names are seldom used to refer to these landmarks in the modern era.

Kahuku Ahupua'a covers the largest area and has a relatively large amount of noteworthy topographical features as well as an extensive mythological background. Due to the fact that only the northwest extreme of the project area is located in Kahuku Ahupua'a, noteworthy Kahuku traditional landmarks within the southern half of the *ahupua'a* will be mentioned in this study. Only two landmarks within the southern half of Kahuku Ahupua'a were found to have

traditional names. Punamanō, which translates as “shark spring,” is a spring-fed wetland located a little more than one kilometer north of the project area (Clark 2002:310). Also within the southern portion of Kahuku Ahupua‘a is Kaauhelema Fishpond (Site No. -268), which was an ancient fishpond named after its *mo‘o* (guardian), named Kaauhelema. This fishpond was once located only several hundred meters west of Kahuku Village. According to legend, “Kaauhelema was half man and half chicken, a being of supernatural power who could change himself at will into a man or a chicken” (McAllister 1933 as cited in Sterling and Summers 1978:152). Before being destroyed for sugarcane cultivation, the pond was said to have been fed by a spring (ibid). McAllister (1933) holds that Ki‘i Wetlands, also referred to by some as Kahuku Fishponds, was always simply a swamp and never used as a fishpond (ibid.). Ki‘i Wetlands, now a National Wildlife Refuge, is located just under two kilometers north of the project area.

In Keana Ahupua‘a, northwest of Makahoa Point is a noted fishing ground, referred to as Kaluahole, which translates as the “pit, or cavern of the ahole fish” (Clark 2002:155; Pukui et al. 1974:78). The *āhole* (Hawaiian Flagtail; *Kuhlia sandwicensis*), is described by Titcomb as “a common shore fish” that inhabits the coral and lava caverns of the reef when mature (1972:59). North of Kaluahole is Ka‘ohana, or “the family,” which is a calcareous sand beach near the Japanese Cemetery (Clark 2002:161). The coastline fronting the Kahuku Golf Course was traditionally referred to as Keone‘ō‘io, or “the ‘ō‘io sands,” where ‘ō‘io is the Hawaiian word for *Albula vulpes*, commonly known as bonefish (Clark 2002:137). This is also the traditional name for the channel that is most suitable for swimming in the area. Pōlou is the name of a pool of water that once existed *makai* of the Kahuku Mill, recorded by McAllister (1933) as Site No. -271 (as cited by Sterling and Summers 1978:154). This pool was said to have been the anchoring spot where the fabled “floating island” of Kahuku attaches to the rest of the island of O‘ahu (ibid.).

Mālaekahana has also been referred to in local mythology. Less than 800 meters *makai* (seaward) of the project area is Makahoa Point, which is located on the north coast of Mālaekahana Ahupua‘a. The beach ends at the south end at Makahoa Point in Mālaekahana Ahupua‘a. Makahoa translates to English as “friendly” or “a companion” according to Pukui et al. (1974:140) and Clark (2002:228). Where the mouth of Kea‘aulu Stream pours into Mālaekahana Bay marks the boundary Keana and Mālaekahana Ahupua‘a. The name Kea‘aulu means “the growing root,” (Pukui et al. 1974:100), which may indicate that traditional Hawaiian agricultural practices likely occurred along Kea‘aulu stream and gulch. Also in Mālaekahana Ahupua‘a is Site No -275, referred to as Wai‘āpuka, which is a pool mentioned in the legendary story of Lā‘ie-i-ka-wai and was said to be the opening of a subterranean cavern with fresh spring that a person could swim underwater for a great distance prior to it being filled in with sediment in the historic era (Sterling and Summers 1978:155). This site is located approximately 1.5 kilometers to the south of the project area.

3.1.5 Traditional Names of the Winds of Ko‘olau Loa

Traditional Hawaiian stories and legends (*mo‘olelo*) have been told and retold; shortened and changed; published in turn-of-the-century Hawaiian language newspapers; and collected for books. In 1902, Moses Kuaea Nakuina published *Moolelo Hawaii o Pakaa a me Ku-a-Pakaa, na Kahu Iwikuamoo o Keawenuiauni, ke Alii o Hawaii, a o na Moopuna hoi a Laamaomao* wherein he

retold a “traditional legend collected from various sources, edited, and expanded” (Nakuina 1992:vii) upon in order to preserve its knowledge. In 1992, an English version of Nakuina’s *mo’olelo* was published as *The Wind Gourd of La’amaomao: The Hawaiian Story of Pāka’a and Kūapāka’a, Personal Attendants of Keawenuia’umi, Ruling Chief of Hawai’i and Descendants of La’amaomao*, with the translation done by Esther T. Mookini and Sarah Nākoa.

This *mo’olelo* retells the story of Pāka’a and Kūapāka’a, who were personal attendants to the ruling chief of Hawai’i, Keawenuia’umi. Pāka’a was the son of a Hawai’i Island ali’i, Kūanu’uanu, and La’amaomao, a “cherished keiki, brought up with care and refinement” in a family of status on Kaua’i (Nakuina 1992:2). Before the birth of his son, Kūanu’uanu returned to Hawai’i Island and La’amaomao was shunned by most of her ‘ohana and left to care for Pāka’a alone in a cave by the beach. When Pāka’a was a boy, he pestered his mother, always asking ‘who is my father?’ When La’amaomao finally answered she told him, “as for your real father, you must look for him. I’ll tell you this: to find him, you must look to the east, where the sun rises and a certain local wind blows. Your father lives there.” Pāka’a determined that he would search for his father when he was “old enough to travel the seas between the islands” (Nakuina 1992:2).

As he grew up, Pāka’a worked hard to help his mother and learned the ways of a fisherman. Pāka’a was clever and determined and when he learned that an ali’i of Kaua’i would be touring the islands, he asked his mother’s permission to join the traveling company. “‘Ae, go,’ said his mother. ‘But go with humility and modesty;...and when you arrive in the presence of Keawenuia’umi, you’ll know you’ve arrived at the place where your father lives’” (Nakuina 1992:14). Then:

La’amaomao lifted the lid of a large calabash and took out a small, long, highly polished gourd in a woven bag. The gourd was covered securely. She turned to her keiki and said, “I’m giving you this gourd which belonged to your extraordinary kupunawahine for whom I was named. Her bones are inside the gourd. While she was alive, she controlled all the winds of the islands-she had them under a supernatural power. She gathered all the winds and put them into this gourd, where they’re still kept. She memorized one by one the names of all the winds from Hawai’i to Ka’ula. On windless days, she could remove the cover and call out the name of a wind, and the wind in this gourd would blow. This gourd, called ‘the wind gourd of La’amaomao,’ was famous.

Before she died, she entrusted me to put her bones inside this gourd and care for them until I had a child. Then I was to give the gourd to the child to watch over. You’re my only child, so now I’m giving the gourd to you. You must look after it according to the wishes of your extraordinary kupunawahine.

You must care for this gourd because it has been handed down from the kupuna. This gourd has great value-you may not think so now, but when you sail with the ali’i and arrive at an area where no wind blows and the canoes are becalmed, say that the winds are at your command; all you have to do is call, and the winds will blow.

When you’re laughed at, remove the lid of the gourd and call for a wind. The wind will blow and bring the canoes to shore. The ali’i will be grateful to you, and you’ll be loved and valued by him.

Before Pāka‘a sailed off, La‘amaomao taught him the names of all the winds, along with the prayers, songs and chants concerning them, and when she was done, Pāka‘a had memorized everything. Then he took the wind gourd and tied it with a cord he had made, prepared his other things for the voyage, and left home (Nakuina 1992: 14-15).

The “grand traveling company” landed first at Waikīkī and from O‘ahu, then continued on to Moloka‘i, Maui, and eventually, Hawai‘i Island, where he found his father in the chief’s court (Nakuina 1992:15). He trained under his father, Kūanu‘uanu, to become a *kahu iwikuamo‘o* (personal attendant). When his father died, Pāka‘a took on the role of *kahu* for the old *ali‘i*. There were those jealous of Pāka‘a’s position and skill and eventually, he fell out of favor with the old *ali‘i* and his court. Pāka‘a left Hawai‘i Island, taking the wind gourd his mother had given him, and sailed to Moloka‘i where he met and married Hikauhi. They had a son named Kūapāka‘a, who was dutiful and learned all his father had to teach (Nakuina 1992).

Many years after Pāka‘a left Hawai‘i Island, the old *ali‘i* became tired of the poor service and greedy manners of his *kahu* and went in search of Pāka‘a. Word traveled that Keawenuia‘umi was searching for him, so Pāka‘a and Kūapāka‘a “gathered their supplies for catching uhu...took along with them the wind gourd of La‘amaomao” (Nakuina 1992:30) and paddled out in their fishing canoe to await the entourage of his *haku* (master, lord). A fleet of canoes laden with the people of Keawenuia‘umi’s court was approaching and each time they encountered a canoe, Kūapāka‘a would ask his father, ‘Is this perhaps my haku?’ and Pāka‘a would reply, ‘It is not your haku’ (Nakuina 1992:33). Kūapāka‘a asked that same question throughout the night and finally Pāka‘a said, ‘When you see the first rays of the sun, you’ll see your haku’ (Nakuina 1992:33). At first light, Pāka‘a ordered Kūapāka‘a to call out to his *haku*, and the *keiki* began to chant:

The canoe is yours,
Great Hawai‘i of Kāne,
Great Hawai‘i, land of the sun,
The sun emerges, emerges,
The sun emerges at Ha‘eha‘e,
With a strong affectionate love for my haku,
Not my real haku,
But a companion of the giddy sun,
The Kona sun without food,
Its loved one has arrived,
Arrived along with Hilo of Kāne,
Hilo of Kāneakapu,
Hilo, land of Kanilehua,
Beloved companion of Keawenuia‘umi mā,
There sits Keawenuia‘umi,
The canoe is yours
(Nakuina 1992:37-38).

Once greetings were exchanged, the *keiki*, Kūapāka‘a, asked Kahikuokamoku, the Kuhina Nui, to bring the canoe fleet ashore, because, “‘Tomorrow is a calm day for sailing; today will be stormy: there are thick cumulus clouds resting above Kawainui and the ridge of Wailau; when

these clouds are blown with full force, a terrible storm will rage; when the clouds are at rest again, then good weather will follow'There were no clouds yet-only the clouds in the wind gourd" (Nakuina 1992:38). The Kuhina Nui asked, "how is it a calm day like today can be a bad day for sailing? The sky is clear, the mountain tops are exposed, and the banks of clouds are asleep at the horizon" (Nakuina 1992:39). Kūapāka'a responded, "This will be a stormy day, a windy day. You came here from Hawai'i with the winds from there; Hawai'i is a windy land and they blow here from behind you." The Kuhina Nui challenged Kūapāka'a, a *keiki* of Moloka'i, on his knowledge of the winds of Hawai'i Island. Kūapāka'a chanted the names of the winds for the west side of the island; he chanted the names of the winds for the east side of the island. Kahikuokamoku asked his advisers if it would storm and they contradicted Kūapāka'a. Encouraged by a look from his *haku*, Kūapāka'a chanted the rest of the names of the winds of Hawai'i (Nakuina 1992). Kahikuokamoku answered:

"The ali'i's canoes won't go ashore with you, ē ke keiki. These winds you've called out belong to Hawai'i. They blow over the sea of 'Alenuihāhā and die out there. The winds of Hawai'i won't reach here."

Kūapāka'a said, "Since you deny the winds of Hawai'i, here in front of you is O'ahu, another windy land."

Kahikuokamoku said, "Let's hear the names of the O'ahu winds."

Kūapāka'a chanted the winds of O'ahu:

There are our clouds, my father's and mine,
Covering the mountains;
The clouds rise with a sudden shower,
The whirling winds blow,
The source of the storm of the keiki,
Ku a ē-ho is at sea
From the sea, the storm comes sweeping toward shore,
The windward Kui-lua wind churns up the sea,
While you're fishing and sailing,...

...The sea wind blows hard,
Māluālua comes from the northeast,
Peapueo is of Kaunala,
Ahamanu is of Kahuku,
Lanakilia is of Hau'ula,
Moa'e is of Punalu'u,
'Āhiu is of Kahana,
Holopali is of Ka'a'awa and Kualoa,...

...The Kona winds turn, the Ko'olau winds turn,
The winds will turn before you and find you,
You will be overwhelmed, O deaf ali'i,
The winds will gather,
The na'ena'e leaves will bend,
You'll be swept ashore at 'Awawamalu,
Caught in the fishing net of the head fisherman,
Your thigh bone and upper arm bone
Will be made into fishhooks,
To catch pāo'o and 'ōpakapaka,
Your flesh will be without bones,

The black crab, the shearwater will eat your remains,
 The life from the parents will be broken off,
 Here I am, the ‘aumakua kanaka,
 Listen to my life-giving words,
 Keawenuia‘umi, come ashore, a storm is coming,
 When you sailed yesterday, it was calm.¹
 After the winds of O‘ahu had been named, the k  naka were uncertain: they didn’t
 believe fully in the keiki’s words, yet they were afraid that the words might be
 right and that some of them might die at sea... (Nakuina 1992:42-44).

The tale continues, P  ka’a urging K  ap  ka’a to call out the names of the winds of Kaua‘i; chant of the destruction to be caused by the wind; call out the names of the winds of Maui and Moloka‘i; and chant of terrible storms and rough seas. P  ka’a had a plan of revenge that required the *ali‘i*, who had blackened his name to Keawenuia‘umi, go ashore. At that time, P  ka’a would then be reunited with his *h  nai* (provider). In the end, “P  ka’a was victorious over his enemies who had come between him and his *h  nai*. With the help of K  ap  ka’a, his keiki, P  ka’a returned to enjoy the comforts and honors and carry out the responsibilities of an *ali‘i* of Hawai‘i” (Nakuina 1992:106).

According to Handy and Handy (1991), the gourd is a personification (*kino lau*) of Lono, the Hawaiian god of agriculture and fertility. “Lono is the gourd; the cosmic gourd is the heavens whence some winds, clouds, and rain” (Handy and Handy 1991:220). In a rite called the “Gourd Prayer” (*Pule Ipu*), a male child was blessed in order that he grow with the vigor of the gourd vine. Lines in the *Pule Ipu* refer to the gourd Lono-kui-kui, Lono-the-punisher, and his wife, Ka-papa-ia-kea, who bore him 12 children. They “dwelt in an underground cavern (*lua*), in which grew famous gourds (his children)...One of these gourd-children...was undoubtedly the great wind-gourd named La‘a-ma‘o-ma‘o. La‘a-ma‘o-ma‘o (Distant-La‘a), or Ka-ipu-makani-a-La‘a-ma‘o-ma‘o (the-wind-gourd-of-the-far-away-heavens-of-La‘a) was a name for the sky and its horizons whence come the winds and rains” (Handy and Handy 1991:219-220).

In consonance with the *mo‘olelo* of the Wind Gourd of La‘amaomao, there is only one named wind within the project area. It is the Ahumanu wind of Kahuku. “Ahu” (lit. to gather or collect) and “manu” (the general name for fowls or the feathered tribe) together literally mean bird gathering or gathering of birds (Andrews 1865; K aleinohea Cleghorn, personal communication 2015) suggesting that birds, and possibly bird hunting/gathering activities, were common in the area.

3.1.6 Mo‘olelo of Kahuku, Keana, and M  laekahana Ahupua‘a

Each *ahupua‘a* in which the N   Pua Makani Wind Project lands are located has a traditional background from the pre-Contact era. Ancient *mo‘olelo* for each *ahupua‘a* helps to explain their traditional names, what kinds of natural resources were found within, what stories and

¹ One of the greatest fears of the *ali‘i* was the desecration of their bones by fishermen who used human bones to make fishhooks. The *mana* (spiritual power) of a person resided in the bones, and this *mana* could be passed on to descendants only if the bones were taken care of. (Thus P  ka’a carries the bones of his grandmother La‘amaomao with him in his gourd.) Fishermen preferred the thigh bone and upper-arm bone for making hooks. If they were lucky enough to find a corpse at sea or washed ashore, they baked it in an *imu* and stripped off the flesh. Sometimes the flesh was used as bait to catch *niuhi* (tiger shark); or it could be left to scavengers, such as crabs and sea birds.

mythological figures are associated with them, as well as the chronicles and conflicts may have occurred there. These facets of the cultural landscape help to provide a connection for modern day cultural practitioners to the land and their ancestors who dwelt in these *ahupua'a*. In addition, traditional *mo'olelo* about each *ahupua'a* is integral to understanding the cultural, historic, and spiritual significance of these lands.

Kahuku Ahupua'a

The name Kahuku appears to be used not only as the name of an *ahupua'a* and village, but as a district or place name for the area roughly between 'Ō'io and Keana Ahupua'a. Of the three *ahupua'a* represented in the project area, Kahuku has the most extensive traditional and mythological background.

Traditional accounts of natural resources and environmental conditions are relatively abundant for the *ahupua'a* of Kahuku. Traditional land use in Kahuku is also made apparent through legend. The landscape of Kahuku appears to have had several configurations, from the pre-European contact era to the present. During Hawaiian settlement prior to the arrival of Europeans, many parts of the landscape were used for traditional agriculture, habitation, and ceremony, varying from intense to moderate. In the early European Contact period, a good portion of the land lay fallow due to severe population decline and was overgrown in some areas with exotic plant species. Thus, there are several conflicting accounts of what the landscape was like and how it was used prior to European contact. Several themes are tied to Kahuku's landscape, including its abundance of *hala*, or pandanus, and its importance to ancient Kahuku's cultural identity.

Fresh water springs were mentioned in several traditional accounts of the Kahuku area. For instance, in the tale of Mekanikeoe, the celebrated adventurer, Mekanikeoe stopped at Punaho'olapa, "a deep spring on the plain of Kahuku," where he found the spring that the legendary *kapa* anvil fell into and ended up in Waipahu, at 'Ewa (Maly and Maly 2003:91). Subsequently, Mekanikeoe "crawled along another path" arriving at another Kahuku spring known as Punamanō (ibid.). A lone rock here, Kū's Rock Spring, was said to give forth pure spring water (Sterling and Summers 1978:153). Further, Handy (1940:88), disclosed that a spring, referred to as Kaainapele Spring, was located *mauka* of the Kahuku Ranch house.

Agricultural terraces were also said to exist in northern Kahuku in the pre-European contact era, which was made possible with the presence of natural springs (Handy 1940:88). There is some debate, however, on the origin of these terraces, where some informants claim that the terraces pre-date European contact and were used in the late 19th Century by the Chinese for rice paddies and some claim that the terraces were built by the Chinese for this purpose (ibid.). On the district of Ko'olau Loa in general, Hall (1839) states that, "...much taro land now lies waste, because the diminished population of the district does not require its cultivation," which upholds the abandonment of taro patches in various locations in Ko'olau Loa due to population decline (as cited in Sterling and Summers 1978:148).

The presence of fish and fishing practices of pre-Contact Kahuku are recalled in legends. In the legend of Kaneaukai, as told by Thrum (1976:254) from April through July, schools of mullet, or 'anae-holo, and surgeonfish, or āa, move from Maui to Waimea, passing by Kahuku. Further, in

the tale, *Two Fish from Tahiti*, Westervelt (1915:138-140) alludes to *kapu* being placed on the catching and eating of certain species of reef fish associated with the Tahitians that fell victim to cannibalism in this story. The story of Punamanō Spring in Kahuku eludes to locals net fishing at the beach at night, which is telling of traditional fishing methods used in Kahuku (Sterling and Summers 1978:150). The story of Kūki‘o Pond holds that the pond was once much larger and had contained a variety of fish. This story suggests that these natural ponds were utilized as brackish water fish ponds in ancient times.

Numerous proverbs, prayers, and *mele* about Kahuku in general elude to its abundance of *hala*, or pandanus trees. Pukui (1983:248) recites the proverb, *Nani i ka hala ka ‘ōiwi o Kahuku*, which translates to, “the body of Kahuku is beautified by hala trees.” In Fornander’s translation of the prayer of Kuali‘i, Kahuku is described as a *hala* tree (Fornander 1917:28). Thrum (1919) also associates pandanus with Kahuku in his translation of Comparison of Kuali‘i, in the following lines:

...Not like the paua [clam or abalone] which cuts the pandanus,
To weave its blossoms at the social gatherings,
That was the knife to cut Kahuku’s pandanus.
[He is] Not like these.
(Thrum 1919:459)

This *mele* compares Kuali‘i with a host of euphemisms that often call upon various localities and objects often associated with them. In a section titled: “Various Heathen Prayers,” Fornander (1920:46-51) translates an untitled prayer with a line that states: “He hala o Kahuku...” which Fornander interprets as, “Full of pandanus is Kahuku...” (1920: 50). Intending to win back the affections of his wife, Halemano, composed a chant that referring to the *hala* trees of Kahuku, stating:

<i>Ku au nana I laila,</i>	I stood and gazed, then
<i>Haloiloi Kuu waimaka e uwe,</i>	Tears filled my eyes causing me to weep.
<i>Nani na hala ka oiwi o Kahuku,</i>	How beautiful are the hala, native trees of Kahuku.
<i>I ka lawe a ka makani he mikioi</i>	As they are being fanned by the Mikioi wind.
	(Elbert 1965:281)

Another tearful sentiment about the *hala* of Kahuku comes from the tragic tale of Kaopulupulu, who’s failed prophecy sealed his death warrant in the time of Kahahana. According to Thrum (1912:210):

...In the morning, ascending a hill, they turned and looked back over the sea-spray of Wailua to the swimming halas of Kahuku beyond. Love for the place of his birth so overcame Kaopulupulu for a time that his tears flowed for that he should see it no more (as cited in Silva 1984:C-4).

Further, Apuakehau wrote in the Hawaiian newspaper, *Kuokoa*, in 1922 that “the first Kahuku” was covered by a *hala* grove (as cited in Sterling and Summers 1978:149). The association of *hala* with Kahuku is even repeated in the traditional Hawaiian myth of Pele and Hi‘iaka (Silva 1984). In this portion of the myth, while Hi‘iaka is in Kahuku (Kahipa), she rebukes two bad-mannered individuals, Puna-he‘e-lapa and Pahi-pahi-alua, who did not pay her the proper respects by stating:

We enter the fragrant groves,
Hala groves whose heads make a calm,
Wild growths by the sea of Kahuku,
But what, indeed are your halas?
Shall their murmur forbid you speech?
Make you dumb to my salutation?
I make this kindly entreaty
To you who sit in the grove
(Emerson 1915:97-8 cited in Silva 1984:C-5).

Silva (1984) adds that Emerson (1915) gathered that there was some word play in the chant, where the word “*hala*” stood for the pandanus tree as well as a fault or a sin. As late as the late 1820s, Chamberlain holds that the Kahuku area was “beautified with lauhala and some other trees” in his manuscript, “Trip Around Oahu in 1826” (as cited in Sterling and Summers 1978:149).

The wearing of *hala*, in the form of plaited *lau* (leaves) *hala* or *leis* made of the *hala* fruit/seed was a way in which the people of Kahuku represented their homeland. In the tale of Kalelealuaka, the strong and brave young warrior who fought for King Kakuhihewa, went to Kahuku and fashioned wreaths of pandanus fruit and sugarcane to disguise himself. He then was able to convince the King’s marshal, who was disabled, that he was from Kahuku and that he would carry the marshal to his destination. As a reward, the marshal granted Kalelealuaka the district of Ko’olau Loa for his services (Thrum 1976:100). Cummins (1913) also calls the Kahuku area as “land of the hala tree” and stated that people should not leave Kahuku for Waimea or Waialua without a wreath of Hala-fruit (as cited in Sterling and Summers 1978:149).

Kahuku was infamous for several other landmarks that stand out in Kahuku’s cultural and physical landscape. Some legends explain the occurrence of these distinctive natural features, such as the tale relayed by Pukui et al. (1974:67) where, Lono-ka-‘eho (Lono the stone), who is described as a chief with eight stone foreheads, severed Kahuku Point from the island. Emerson (1909) translates the verses of a *hula* that describes a few of these landmarks of Kahuku in a rather colorful way. He precludes the translation with the quip, “Whether there is any connection between the name of the hula – breast-beating – and the expression in the first verse of the following mele is more than the author can say.” The verses for this *hula* are translated by Emerson into English as:

‘Tis Kahipa, with pendulous breasts;
How they swing to and fro, see-saw!
The teeth of Lani-wahine gape –
A truce to upper and lower jaw!
From Lihue we look upon Ewa;
There swam the monster, Miko-lo-lou,
His bowels torn out by Pa-pi-‘o.
The shark was caught in grip of the hand.
Let each one stay himself with wild herbs,
And for comfort, turn his hungry eyes
To the rustling trees of Lei-walo.
Hark! The whistling-plover – her old-time seat,

As one climbs the hill from Echo-glen,
And cools his brow in the breeze.
(Emerson 1909:206)

Emerson goes on to say that, “The thread of interest that holds together the separate pictures composing this mele is slight. It will, perhaps, give to the whole a more definite meaning if we recognize that it is made up of snapshots at various objects and localities that presented themselves to one passing along the old road from Kahuku, on O‘ahu, to the high land which gave the tired traveler his first distant view of Honolulu before he entered the winding canyon of Moana-lua” (ibid.). He adds that Kahipa is the name of a fabled female character, which was then applied to a locality in Kahuku where the mountains resemble two female breasts. Further, he describes Lani-wahine as, “A benignant *mo‘o*, or water-nymph, sometimes taking the form of a woman, that is said to have haunted the lagoon of ‘Uko‘a, Waialua, O‘ahu” (ibid.).

Another tale of the distinguished promontory, referred to as Kalaeokahipa is as follows:

Nawai-o-lewa is on the northwest side of the rocky brow of Kalaeokahipa and now only one breast is left to move in the gusty winds of Kuhuku-lewa. The other was broken off by that supernatural son of Ku and Hina...Between Kalaeokahipa and Nawaiolewa, just above is a small round opening to a secret cave...The small secret cave belonged to Kaalae-huapi (Red head mud hen) and others in the first Kahuku that was covered by a hala grove (J.K. Apuakehau, Kuokoa, June 29, 1922 in Sterling and Summers 1978:152).

Sterling and Summers (1978:151-2) list numerous historic references to Kalaeokahipa, most enlisting the use of the word “breast(s)” to describe the peak(s).

Also of note are the harsh currents and surf of Kahuku’s coasts, which are mentioned in *The Birth Chant of Princess Bernice Pauahi Bishop*, as translated by Ahuena Taylor, which follows:

...Who builds the heat, the oven, until the long fires
Become like a wild sea.
From “Kama” to “Waialua.”
And comes close the head lands of “Kahuku,”
And the hawk-like scratching sea of “Kahuku,”
The night was spent at “Waialua,”
For a voice was at the sea of “Ewa.”
Listening for the response.
Respond! Oh Heavenly one...
(Kanahele 2002: 223-226)

This chant lends a rather rough image to the coast of Kahuku.

Kamakau (1964) tells of a famous hiding cave, referred to as Pohukaina, thought to be a considerable distance *mauka* of the Turtle Bay Resort area. This cave, which had an entrance in Kahuku, is described by Kamakau:

The mountain peak of Konahuanui was the highest point of the ridgeline of this burial cave “house,” which sloped toward Kahuku. Within the cave are pools of

water, streams, creeks, and decorations by the hand of man (*hana kinohinoh'ia*), and in some places level land (Kamakau 1964:38).

The great cave of Pohukaina is also said have been the refuge and storage place of “much wealth” for O‘ahu’s chiefs (ibid.).

Although Kahuku lacked physical evidence of taro terraces along Kahuku Stream, informants interviewed by Handy and Handy in 1991 claimed that there was taro cultivation in ancient times (Handy and Handy 1991).

Hawaiian legend holds that Kahuku was once a floating island blown here and there by the trade winds and is recounted by many sources in several different ways. Pukui (1983) writes of the traditional proverb, *Kahuku ‘āina lewa*, which translates as “Kahuku, an unstable land...” and later writes that, “O‘ahu, according to legend, was once two islands that grew together. Kahuku is the part that bridges the gap” (Pukui 1983:144). Yet, there are many variations to this legend. In one version, the people of Kahuku grew tired of the moving island bumping against O‘ahu, so they fastened Kahuku to O‘ahu with fishhooks. McAllister (1933:155) retells this story in great detail:

A story is told that Kahuku was once a land afloat, wafted about by the winds, drifting over the ocean. Just how it came to Oahu is not told, but old Hawaiians point out to Polou, the place where Kahuku is fastened to Oahu. Formerly it was possible to dice into the pool and when a depth of 40 fathoms was reached, a shelf of rock was found upon which to rest. Forty fathoms deeper Punakea (white line from coral) was reached and on looking toward Malaekahana, the hook by which Kahuku was made fast could be seen. This hook was intricately fashioned of Kawila (*Alphitonia excelsior*). Seaward of the Waialeale Industrial School, in another pool of water, known as Kalou, is the spot where Kahuku is attached to Waialeale... (McAllister 1933:155).

In addition, when McAllister (1933) relays the story about Kāne and Kanaloa, one line repeats the common tale that Kahuku was not attached to O‘ahu in ancient times, stating that “Kane and Kanaloa lived in the vicinity of the ridge (Kalaiokahipa ridge); but that was at the time when the Kahuku plain was still under water, and the waves lapped about Kalaiokahipa” (as cited by Wong-Smith 1989:A-2).

Silva (1984) lists several stories of how Kahuku was reattached to O‘ahu. One colorful account holds that the floating island of Kahuku belonged to the *menehune*, stating as follows:

Ka-hu-ku section of O‘ahu was once a separate island...It was an islet whose people were the Mene-hune, or Dwarfs as they are called today. Many stories are told about the miraculous feats performed by the Little People of ancient Hawai‘i. It is known, that they always worked from just after sunset until just before dawn.

Legend tells us that Kahuku was a floating island situated several miles out to sea. For a long time, the people of O‘ahu had planned to make the island part of their land, for they saw it come close to O‘ahu’s shores. The floating island of the Menehune did not have any fresh water springs because there were no high

mountains covered with verdure and trees to capture the rains. So, the Little Folk used to paddle their islet into the bays of O‘ahu at night to haul water from the springs of the large island.

One day, a resident of Kahuku suggested that all the people gather together to make strong hooks of whalebone and attach them to a stout rope made of sacred olonā fibers. This was done.

The Menehune came to take water as usual, then the residents of O‘ahu attached the large hooks to the floating isle while the Menehune started to paddle off again, but they could not move their islet or free it from the ivory hooks and olonā ropes.

Today, many people who travel Kahuku section of O‘ahu and see the many islets seeming to float off shore, and hear the sea singing its songs, they say, ‘Listen to the Menehune grumbling while they try to move their island that used to float!’

The rumbling and grumbling is heard only at night, for that is the time for the Menehune to be working at Kahuku. (Paki 1972:53 as cited in Silva 1984:2-3)

Another account of Kahuku being an island was provided by Silva (1984), which also links the locality with a legendary princess, named Lā‘ieikawai, and reads as follows:

Kahuku District, according to legend, was once a floating island blown about by the winds. As it banged against O‘ahu, it made noises which disturbed the old women guarding the princess Laieikawai. The old women grappled the island with fishhooks and attached it securely to O‘ahu. Polou pool on the sea side of the Kahuku mill is one spot where the hook was fastened. The other end was fastened at Kūki‘o pond 300 feet inland at Kahuku Point (Boswell 1958:68 as cited in Silva 1984:2).

Other versions provide a political motive for uniting the two islands. A portion of the tale of “The Hole of Kahipa and Nawaiuolewa” was told to Mary Pukui by a one-hundred and five year old woman named, Kanui, who described how two ruling chiefs united Kahuku with O‘ahu. In this tale, “the two were brother and sister. In order to make it one, the two sat down and hooked their fingers together and drew them together. The hole marks the place where they sat (Kamakau Part II, Moolelo o Hawaii, Note 4, Chap 12, as cited by Sterling and Summers 1978:151). Kamakau (1991:38-9) holds that O‘ahu was a floating island, rather than Kahuku. However there are some consistencies with the previously mentioned versions. He writes:

According to traditions of some people, O‘ahu was said to have once been a floating land, *he ‘āina lewa o O‘ahu*. The Kahuku side was a wide open gap (*puka hāmama*) and this was called *Ka Puka o Kahipa a me Nawaiuolewa*, “The opening of Kahipa and Nawaiuolewa.” The piece of land that closed it up was called Kahuku, and the hooks that made fast the piece of land and joined it to the island were called Kilou and Polou (Kamakau 1991:38-39).

Another variation of the story told holds that there was an underground canal or tunnel where the two islands joined. In 1828, Levi Chamberlain, a missionary accountant, tells of a 5-7 mile

long by 1-2 mile wide underground canal leading from the sea inland at the convergence of the two islands (Chamberlain 1957:35-36). He reiterated the following in regards to this legend:

The natives tell a marvelous story respecting the origin of this district [sic], which they say floated in from the sea, and attached itself to the ancient shore of the island, that there was a subterranean communication between the sea and the ancient shore, by which a shark used to pass, and make depredations up on the land. The basis of the tract, which is from five to seven miles in length, and from one to two miles in breadth, appears to be of coral; and it was evidently redeemed from the sea, as a good deal of land, in many places along the shore around the whole circuit of the island, evidently has been (Chamberlain 1957:35-6).

McAllister (1933) relays a story about a secret underwater passage way marked by two stones off of Kahuku Point that led to another land referred to as Ulukaa or Kahuna Moku. The story is as follows:

Two stones known as Kahoa in water about 250 ft. from the beach just opposite from Kalaehila heiau, Kahuku Point. Many years ago a woman who lived on this beach was frequently seen to swim to these stones and disappear. At times she would be gone for as much as a week. Sometimes she was seen to put her clothes in a watertight calabash and swim away. When she returned she usually wore a kou lei. It was finally discovered that this was the entrance to another land, known as Ulukaa or Kahuna Moku (as cited by Silva 1984:A-5).

The theme of an underground canal is echoed in Thrum's (1911) "Legend of the Tapa Log," which largely takes place in Punahoolapa Marsh, located in the southeast corner of the Turtle Bay Resort property and currently a wildlife preserve. Thrum's story is as follows:

A kapa-beating log of peculiar sound, unlike any other known on the island, which was placed in its waters at the close of the kapa-making season to keep it smooth and free from cracks that would impart an impression to the cloth in its manufacture, was missed, and, believing it to have been stolen, search was made all through the Koolau, Waialua and other districts 'til at last it was found in use at Waipahu. Recognizing it by its resonant tone, it was claimed by the searching owner, and right thereto by those in possession was vigorously maintained. To test the truth of ownership as claimed, the 'Ewa people accompanied the claimant back to Kahuku to visit the scene and witness a test of the underground stream theory. A bundle of ti leaves were gathered, which was wrapped together and consigned to the waters of Punahoolapa. In the course of a few days they were lost to sight, whereupon the party set out for 'Ewa, and after careful watching, as predicted, the bundle of ti leaves came forth on the bosom of the waters of the Waipahu stream. The kapa log was thereupon recognized as the rightful property of the Kahuku claimant (Thrum 1911:130 as cited in Sterling and Summers 1978:149).

Associated with Kahuku's underground canal are several legends of man-eating sharks, where a shark once traversed to consume people (Chamberlain 1957:35-36). In Handy (1922:111), Manō-niho-kahi (shark with one tooth) is a man who had the power to shape-shift into a shark. This version of the tale presents him as normal looking, except for the shark mouth on his back

that he always covered with a cloak of *tapa*. When Manō-niho-kahi found out that people, specifically women, were going to the sea to fish or collect *limu*, he would rush out to where they were and bite them with his single shark tooth, killing them. When the killings became too regular, the chief of the region and his *kahuna* gathered all of his people and ordered them all to disrobe. When Manō-niho-kahi refused to take off his *tapa* cloak, he was stripped, revealing the shark mouth on his back. At once, he was put to death, ending the streak of deaths of women in those waters. Another, albeit less gruesome, tale about man-eating sharks associated with Kahuku is told by McAllister (1933), where a shark was caught and kept as a pet in Punamanō marsh, which is located just east of Turtle Bay Resort lands. The story, as reiterated from an informant's testimony is as follows:

One time when the people of Kahuku were fishing they caught a small shark. Putting him in a calabash of water they carried him to their houses near the beach. Here he was cared for and put in larger and larger calabashes as he grew bigger. Finally having outgrown even the largest calabash that could be found, it was decided to place him in one of the pools of brackish water which came to be known as Punamanō. A man and woman living near the pool became guardians. They had lived in their grass huts with a breadfruit tree near the pool and taro and potato patches near the mountains for several years when the brother of the woman came to live with them. Sometime after, the man and his wife went to the mountains to gather taro and potatoes. The brother, who was staying at home, thought that he would like to have some food prepared when the sister and her husband returned. He climbed the breadfruit tree and gathered several, throwing the fruit into the water instead of on the ground, where it would have been bruised in the fall. After picking enough for a few days he descended the tree and gathered most of the fruits from the bank. Two had floated to the middle of the pond and he could not reach them. Now this man knew of the shark that lived in the pool, but he had frequently bathed in the pool and no thought of fear crossed his mind as he swam to the breadfruit. He did not know, however, that his sister and her husband had warned the shark not to allow anyone to steal breadfruit when they were gone. When the sister and her husband returned they could not find brother. Neither was the shark to be found, but they saw the breadfruit floating in the pool and the reddish color to the water. They guessed what had occurred. For nearly a mile they followed the bloody trail until they came to a spring known as Punahoolapa. Not only was the brother never seen, but the shark has never been seen to this day (as cited in Wong-Smith 1989:A-7).

In this case, it appears that the shark was simply looking out for its keeper's interests. Kuapuu (1861) wrote a very similar account of the Punamanō man-eating shark in the *Ka Hae Hawaii* newspaper (as cited in Sterling and Summers 1978:151).

Other supernatural beings and demigods associated with Kahuku are mentioned in Beckwith (1940). On a quest to find his brother, Lono-ka-ehu brought his "great dog" or the dog-man, Kū-'ilio-loa (Kū long dog), to O'ahu from Kahiki. In the search, Kū-'ilio-loa "pierced the hill Kāne-hoa-lani at Kualoa, cleft Kahuku and Kahipa apart, and broke Ka-pali-ho'oku'i at Kailua" according to Beckwith (1940:321). She later describes Kū-'ilio-loa as "a dog with a human body and supernatural power, 'a great soldier and famous warrior,' who terrorizes Kahiki" (Beckwith 1940:321).

Kahuku is also a place where the manifestation of ancient *kapu* law had become a permanent part of the landscape in the form of two stone outcrops. According to Beckwith (1970:48), Kamakau mentioned the story of two stones in the cave of Ke-ana at Kahuku that are said to be the bodies of two boys who disobeyed their mother's injunction to keep silence during a thunderstorm. Kāne-hekili, the god of thunder, is associated with several gods whose names are also suggestive of the phenomenon experienced during thunderstorms, such as Kāne-wawahi-lani (Kāne breaking through heaven) and Ka-uila-nui-maka-keha'i-i-ka-lani (Lightning flashing in the heavens). The gods in their humpbacked forms can be seen flying through the air during storms with Na-kolo-i-lani, who are the humpbacked brothers of Pele. According to the ancient *kapu* laws, all containers should be turned bottom side up and people should lie face down without any outcry, for silence is the law of Kāne-hekili (Beckwith 1970:48).

Another well known *mo'olelo* is the Legend of Kamapua'a, a supernatural being and a deity attributed to agriculture, rain, and fertility (Elbert 1965:200-1; Maly and Maly 2003:9). While he had the ability to shape-shift into multiple bodily forms (*kino lau*), Kamapua'a was most noted for his pig-like appearance. In one of his many exploits, Kamapua'a was caught stealing chickens from Olopana, the head chief of O'ahu at the time. To catch Kamapua'a, Olopana enlisted the residents of Kahuku, who capture him, bind him to a pole, and carry him towards Punalu'u. Upon seeing this, his grandmother, Kamaunuaniho, recited a chant that gave him the power to kill the captors from Kahuku.

In *The Hawaiian Romance of Laieikawai*, the people of Waianae on O'ahu offered their version of the story, which mentions the high chief who ruled Kahuku named, Kaho'ali'i. In this account, Kaho'ali'i instructs his son to, "Fly about O'ahu while I chew the 'awa; before I have emptied it into the cup return to me and rehearse to me all that you have seen" (Beckwith 1918:30). The tale goes on to list the places his son passed on his journey. Further, Kahuku is mentioned in the chant of Kuali'i as one of the major landmarks of O'ahu for those travelling to the island from Kaua'i (Beckwith 1918:30).

In the tale, *Two Fish from Tahiti*, Westervelt (1915:142-144) recounts two great canoes filled with men from Tahiti, referred to as two "fish," journeyed to O'ahu. The purpose of the journey was to "find the wonderful fire-land of Hawaii about which they had been taught in the stories of returned travelers..." and "...find an appropriate location for a settlement. Possibly they planned to make a permanent home or hoped to meet some good community into which they might be absorbed" (Westervelt 1915:140). Upon their arrival on the shores of Makapu'u, the travelers found an "unfriendly coast" and decided to separate and circle the island, with one canoe going north and one going south. Westervelt continues:

The boat which sailed toward the north found no good resting-place until it came to the fishing-village of Hauula...Evidently there, was dissension and at last a battle. The whole story is summed up by the Hawaiian legend in the saying: "The fish from Tahiti was caught by the fishermen of Hauula. They killed it and cut it up into pieces for food." Thus the visitors found death instead of friendship, and cannibalism was thereby veiled by calling the victims "fish" and the victory a "catch..."

...The second fish from Tahiti had gone on southward in its journey around the island of Oahu. It passed the rough and desolate craters of Koko Head on the

eastern end of the island. It swam by Diamond Head and the beautiful Waikiki Beach. Either the number of the inhabitants was so large that they were afraid to make any stay or else they preferred to make the complete circuit of the island before locating, for they evidently made only a very short stay wherever they landed, and then hurried on their journey. By the time they reached Kaena, the northwestern cape of Oahu, they were evidently anxious concerning their missing companions. Not a boat on the miles of water between Kaena and Kahuku, the most northerly point on the island. The legend says that the fish changed itself into a man and went inland to search the coast for its friend, but the search was unsuccessful. It was now a weary journey from point to point, watching the sea and exploring all the spots on the beach where it seemed as if there was any prospect of finding a trace of their expected friends. Where a break in the coral reef permitted their boat to approach the land they forced their way to shore. Then when the thorough search failed again, the boat was pushed out over the line of white in rolling breakers to the great sea until at last the Tahitians came to Kahuku.

Now they appeared no longer as “fish,” but went to the village at Kahuku as men. They made themselves at home among the people and were invited to a great feast. They heard the story of a battle with a great fish at Hauula and the capture of the monster. They heard how it had been cut up and its fragments widely distributed among the villages on the northwest coast. Evidently provision had been made for several great feasts. The people of Kahuku, although several miles distant from Hauula, had received their portion. The friendly strangers must share this great gift with them. But the men from Tahiti with heavy hearts recognized the fragments as a part of their companion. They could not partake of the feast, but by kindness and strategy they managed not only to decline the invitation, but also to secure some portions of the flesh to carry down to the sea. These were thrown into the water, and immediately came to life. They had the color of blood as a reminder of the death from which they had been reclaimed. Ever after they bore the name “Hilu-ula,” or “the red Hilu.”

Then the “fish” from Tahiti went on around to Hauula. They went up to the tabu land back of Hauula. They pulled up the tabu flags. Then they dammed up the waters of the valley above the village until there was sufficient for a mighty flood. The storms from the heavy clouds drove the people into their homes. Then the Tahitians opened the flood-gates of their mountain reservoir and let the irresistible waters down upon the village. The houses and their inhabitants were swept into the sea and destroyed. Thus vengeance came upon the cannibals. The Tahitians were “fish,” therefore they went back into the ocean to swim around the islands. Sometimes they came near enough to the haunts of fishermen to be taken for food. They bear the name “hilu.” But there are two varieties. The red hilu is cooked and eaten, but never eaten without having felt the power of fire. The trace of the cannibal feast is always over its flesh. Therefore it has to be removed by purification of the flames over which it is prepared for food. The blue hilu, the natives say, is salted and eaten uncooked. Thus the legend says the two fish came from Tahiti, and thus they became the origin of some of the beautiful fish whose colors flash like the rainbow through the clear waters of Hawaii (ibid.:142-144).

This account calls attention to the political control of resources, *kapu* systems, variations in conduct with outsiders as well as warfare and cannibalism in pre-European contact Kahuku and Hau‘ula.

Keana Ahupua‘a

Few traditional legends mention Keana Ahupua‘a specifically. One of which is the section of the Pele and Hi‘iaka legend, where Hi‘iaka passes through Lā‘ie, Mālaekahana, and Keana to make her way to Kahuku (Emerson 1915:233). However, there are a number of traditional sites associated with legendary stories in the *ahupua‘a*.

For example, two large stones in the Keana Cave or Rock Shelter (Site No. -270) are said to be the remains of two boys who failed to follow their mother’s orders to stay silence during a thunderstorm, which was the *kapu* (law) of the god of thunder, Kane-hekili (Beckwith 1940:48). According to Beckwith (1940:48) “During such a storm all containers should be turned bottom side up; all persons should lie face down-ward and make no outcry.” Emerson’s (1915) rendition of this tale is as follows:

In Kahuku, island of Oahu, at a place not far from the sugar-mill, is a cave, known as Keana. In former times this cave was the home where lived a mother and her two sons. One day, having occasion to journey to a distance, she left them with this injunction, “If during my absence you hear the sound of thunder, keep still, make no disturbance, don’t utter a word. If you do it will be your death.” During her absence, there sprang up a violent storm of thunder and lightning, and the young lads made an outcry of alarm. Thereupon a thunderbolt struck them dead, turning their bodies into stone. Two pillar-shaped stones standing at the mouth of the cave are to this day pointed out in confirmation of the truth of the legend (Emerson 1915:233).

Additionally, Pōlou (Site No. -271), which was described by McAllister (1933) as once being, “a pool of water, sea side of the Kahuku mill,” was located in Keana Ahupua‘a. This was said by some *kūpuna* to be the place where the “floating island” of Kahuku attached to the Island of O‘ahu. It was also said to be the location of a “stone” known as Kanaloa (ibid).

Mālaekahana Ahupua‘a

Several legendary stories reference Mālaekahana as a locality, and the name itself is shared with a great heroine of ancient myth and the mother of Lā‘ie-i-ka-wai and her twin sister, Lā‘ielohelohe. In the story of Lā‘ie-i-ka-wai, Beckwith (1940:526-527) describes the nature of the twin’s birth, betrothals, and trials in finding the right suitor:

Laie-i-ka-wai and her twin sister Laie-lohelohe are born at Laie on Oahu of Kahauokapaka the father, chief of the northern lands of the island, and Malaekahana the mother. Since the father has vowed to let no daughter born to his wife live until she bears him a son, the mother conceals the birth of the twins and gives them to her own relatives to rear, Laie-lohelohe to Ka-puka-i-haoa to bring up at the heiau at Ku-kani-loko, and Laie-i-ka-wai to Waka, who first hides her in a cave near Laie which can be reached only by diving into the pool which conceals the entrance, and then takes her to the uplands of Puna. Here she builds a tapu house for her ward thatched with bird feathers, and gives her birds to

wait upon her and mists to hide her from the sight of men until such time as a suitable lover shall appear to make her his wife.

The first whose suit seems acceptable is Kauakahi-ali'i, ruling chief of Kauai and husband of Ka-ili-o-ka-lau-o-ke-koa (Skin like the leaf of the koa). The reappearance of his wife whom he had mourned for dead prevents the appointed meeting, but on his return to Kauai he relates the adventure and the young chiefs of that island are stirred by the story. Aiwohikupua meets her nightly in dream and goes to woo her, but even the presence of his four sweet-scented kupua sisters, named after the four varieties of maile vine whose scent they inherit, cannot shake her refusal. Enraged by the insult, he abandons the sisters in the forest. His fifth and favorite sister, Ka-hala-o-mapuana (The fragrant hala blossom) refuses to abandon them. Through her clever management she attracts the attention of Laie-i-ka-wai and the five are adopted as sisters and made the guardians of Paliuli. They drive off their brother upon his second attempt to win the chiefess, and a guardian mo'o named Kiha-nui-lulu-moku (Great mo'o shaking the island) completes his discomfiture. Another and more favored young chief from Kauai named Hauailike is also expelled by the watchful youngest sister.

Waka now arranges a match with Ke-kalukalu-o-ke-wa, younger brother of Ka-ili-o-ka-lau-o-ke-koa and successor with her to Kauakahi as ruling chief of Kauai. Just as the formal marriage (hoao) is about to be consummated, a young rascal from Puna named Hala-aniani, aided by his sorceress sister, carries her off on his surfboard in place of the legitimate lover. Waka finds them sleeping together and abandons the girl in a rage, stripping her of mist and bird guardians and of the house thatched with feathers whose protection her loose conduct has forfeited. The five sisters and the great mo'o, however, refuse to abandon their mistress. Since the Kauai chief has made her twin sister Laie-lohelohe his wife in place of their disgraced mistress, they determine to retrieve her fortunes by providing a more splendid match, and the clever youngest sister is despatched, with the great mo'o as carrier, to fetch their oldest brother who lives as a god in a tapu house in the very center of the sun in the highest heavens. While she is away on this errand the group leave Paliuli and travel about the island and, meeting an old family guardian and seer named Hulu-maniani, make their home with him as adopted daughters at Honopuwai-akua on Kauai. Throughout the course of the story this old seer (kaula) has been following around the islands after the rainbow sign which hovers over the place where Laie-i-ka-wai is hidden, determined to make this new divinity his chief and thus provide for his own old age.

Ka-onohi-o-ka-la (Eyeball of the sun) looks favorably upon his sister's proposal and, putting off his nature as a god, he descends to earth, strips the enemies of Laie-i-ka-wai of their lands and power and, leaving Ke-kalukalu-o-ke-wa and the twin sister rulers over Kauai, gives to each of the sisters rule over one of the other islands of the group and takes Laie-i-ka-wai up on a rainbow to live with him in Ka-hakaekaea. All goes well until, on one of his visits to earth to see that all goes well there, he notices the budding beauty of his sister-in-law. He presses his attentions and succeeds in securing her. His wife in the heavens wonders what important affairs keep him so long on earth. In the temple at Kahakaekaea stands the gourd Lau-ka-palili which reveals to one who looks within what is going on below. Laie-ika-wai discovers her husband's infidelity and reports him to his

parents, who live with her in the heavens. They banish him to become a wandering spirit, the first lapu (ghost) in Hawaii. Laie-i-ka-wai returns to earth and lives like a god with her sister. Today she is worshiped as Ka-wahine-o-ka-liula (Lady of the twilight, mist, or mirage) (Beckwith 1940: 526-527).

Another fable that takes place in primarily in Mālaekahana Ahupua‘a area is that of “Manuwahi: A Legend of Oahu” in *Hawaiian Legends* (Rice 1923), which is told as follows:

At Laie lived Manuwahi, Free Gift, with his son, Ka haku loa, The-Lord-of-a-Long-Land; his grandson, Kaiawa, Bitter Sea, and his great-grandson Kauhalekua The-Village-on-the-Ridge. These men were the keepers of the akua at Laie.

Manuwahi and his children were hairless and were possessed of supernatural powers.

Manuwahi planted black and white area far up in the mountains for the use of the akua. Every awa root planted was given one of these names, Kaluaka, The-Hole-That-Gives-a-Shadow; Kumumu, Blunt-Edged; Kahiwa, Best-Awa, or Kumilipo, The-Root-of-Unconsciousness. This was done so [that] Manuwahi, when sending one of his sons for a piece of awa could designate the exact one he wished.

When the awa a was given to him, Manuwahi would prepare it, and then summon the akua from the North, South, East, and West, as well as from above and below, to drink of it. They prayed in this wise, before they drank:

Gods of the Morning,
Gods of the Night,
Look at your progeny:
Grant them health,
Grant them long life;
Amama ua noa - it is free!

It happened that during this time Kamehameha I had come to conquer Oahu. He had succeeded in subduing all the island except Malae-kahana, between Laie and Kahuku. Determined to add this place to his conquests, the king sent one of his body guard, Ka-hala-iu, In-the-Shadow-of-the-Hala-Tree, with many of his bravest soldiers to subdue Malae-kahana.

Ka-hala-iu marched as far as Hanapepe the first day, where he spent the night. Early the next morning he set out and meeting Manuwahi, whom he did not recognize, asked him where the powerful kahuna of Malae kahana lived.

Manuwahi answered, “Pass over the river and you will see a spring and nearby a hut with trees about it. This is his home.”

Ka-hala-iu did as he was told and had soon surrounded the hut with his soldiers. When Manuwahi's son came out Ka-hala-iu asked him, “Where is your father?”

“Did you meet a bald headed man?” asked the boy in turn.

“Yes,” replied Ka-hala-iu.

“Well, that was my father. Why did you come here?”

"I came to kill your father by the orders of King Kamehameha," answered the King's man. Deciding it would profit them nothing to kill the son, the soldiers departed for Hanapepe by the makai side of the hill, and failed to meet Manuwahi, who had returned to his home by the mauka side.

The next morning the King's body-guard again surrounded with his soldiers the home of the kahuna. Manuwahi came out and asked, "What are you here for? Did you come for battle?"

"Yes," answered the fearless soldier, "We came to kill you."

Whereupon Manuwahi called to his assistance all the akua from the North, South, East and West as well as those from above and below. They came at once and gave battle to the soldiers of the king. The akua fought by biting and scratching their assailants and before long they had killed all but Ka-hala-iu.

Ka-hala-iu cried out, "Spare my life, kahuna of the gods, and I will stay with you."

"What can you do if you stay with me?" asked Manuwahi.

"I will plant awa for you. I came from Hawaii, where I lived by planting awa," answered Ka-hala-iu.

But Manuwahi said, "I do not need you. Go back and tell your king that even his bravest soldiers were not able to conquer Malae-kahana. Tell him that all but you were killed by the akua there."

When Kamehameha had heard these words he sent Ka-hala-iu back with another body of soldiers with orders that he must conquer Malae-kahana.

In the meantime, Manuwahi had moved with his sons up to the cave of Kaukana-leau, where the natives made their stone adzes. There the King's soldiers met them. As before, Manuwahi called all the akua to his aid. Again the soldiers were quickly put to death and only Ka-hala-iu was left. So Malae-kahana was not conquered.

Ka-hala-iu respected and admired Manuwahi so much that he was very anxious to remain with him, and so he asked again to be allowed to remain as an awa grower. Manuwahi consented this time and gave him one side of the valley to cultivate in awa.

One day as Ka-hala-iu was preparing the side hill for its cultivation. He noticed that on the opposite side of the valley, trees and bushes were falling in every direction, as if a whirlwind were uprooting them. This frightened him very much, as he could not understand the phenomenon, so he ran in great haste to Manuwahi, and asked what it meant. Manuwahi told him that his akua were helping in the clearing of the side hill, and that if he wished them to help him they would gladly do so. Ka-hala-iu was only too happy to have help so he called upon the akua, and in a short time both sides of the valley were cleared, and were growing luxuriantly with the most beautiful awa.

After the battle, between Ka-hala-iu and the akua for the possession of Malae-kahana, Manu-ka, Frightener-of-Birds, one of Manuwahi's sons, moved to Kaneohe, where he died some time later. He was buried makai of the present

road. The natives dug a very large grave but before they could cover the body the akua brought red dirt from Ewa, in a cloud, which filled the grave, and made a red hill above it, which can be seen to this day. There is no other red dirt in that district (Rice 1923:113-115).

In Fornander's (1920) "Legend of Halemano," the hero, Halemano, passed through the area, mentioning Kahuku and Mālaekahana. In this story, Halemano's companion, Kumukahi, arrived at Hauula after they fled Hawai'i and so admired an upright image, named Mālaekahana, that he decided to stay in the area while the rest of his party continued on (Fornander 1920:236). It is possible that the statue was created in the likeness of its heroin namesake. The site of this statue may have been McAllister's Site No. -273, which is described as the *kauahale*, or house, foundation that once belonged to the *kahuna* (priest/sorcerer), Manuwahi, who was the keeper of the god of Mālaekahana (Sterling and Summers 1978:154). This site was located just within southern boundary of Mālaekahana Ahupua'a, near the present day entrance to the Mālaekahana State Recreation Area, which is approximately 1.5 kilometers southeast of the project area.

Mālaekahana is also associated with one of the many legends of shark gods. In this tale, Manō-niho-kahi (Shark with one tooth), resides near a spring in Mālaekahana located somewhere between Lā'ie and Kahuku, perhaps Wai'āpuka (Site No. -275). When Manō-niho-kahi spies a woman going to gather fish or *limu* (seaweed) from the ocean, he tells her to be wary of sharks, before attacking and killing her himself (Beckwith 1940:142). Subsequently, the chief detected Manō-niho-kahi out of a line-up of villagers when his tapa cloak is removed, revealing the mark of the shark's mouth on his back.

Wai'āpuka (Site No. -275), located in the *kula* of Mālaekahana, is noted in 1888 by King David Kalākaua in his book, *The Legends and Myths of Hawaii*, as a significant feature of Mālaekahana's landscape as well as an important locale in "The Story of Laieikawai." He iterates the acts of Waka, Laieikawai's grandmother, who provided the infant Laieikawai sanctuary from her father's wrath for not being born male, as follows:

In his absence she was delivered of twin girls, who were named Laieikawai and Laielohelohe. They were surpassingly beautiful children, and, desirous of saving their lives, the mother consigned the first-named to the care of Waka, the child's grandmother, and the other to Kapukaihooa, a priest of discretion and sanctity.

On the return of the husband he was told that the expected child came into the world without life. He knew that a birth in his house had occurred during his absence, for he had heard two distinct claps of thunder.

Waka took her foster-child to the cavern which opens into the pond of Waiapuka, and which can be entered only by diving. Laielohelohe was taken by her priestly protector to the sacred enclosure of Kukaniloko, on the western side of the island, and there tenderly cared for.

The moment Waka entered the cavern of Waiapuka with Laieikawai a rainbow appeared over the place, and was constantly visible so long as the child remained there. Even when the sun was obscured by clouds the rainbow could be seen.

At length the rainbow was observed by the great prophet Hulumaniani on the distant island of Kauai. For twenty days in succession he saw it, and knew its significance. He secured a canoe and fifteen men from Poloula, the chief of Wailua, provided himself with a black pig, white fowl and red fish for sacrifice, and, when the star Sirius rose, set sail for Oahu.

Reaching that island he landed at Waianae, and, guided by the rainbow, in due time arrived at the pool of Waiapuka.

Waka had just dived into the cave, and he noticed ripples on the water. During the day Waka started to leave the cavern, but caught a glimpse of the prophet sitting on the bank, and quickly returned, again ruffling the water.

The prophet remained by the pool all night, and in the morning saw a rainbow over Kukaniloko. Traveling in that direction, he ascended Mount Kaala, when he saw the rainbow over the island of Molokai. Finding a canoe bound thither, he took passage and landed at Haleolono, near the western shore.

In a dream Waka had been directed by Kapukaihaoa to remove Laieikawai to some securer place, and had accordingly taken her to Malelewaa, a secluded spot on the north side of Molokai (Kalākaua 1990:457-458).

Another mythical tale attributed to Mālaekahana Ahupua‘a concerns Laniloa, which the name given to a point of land that extends *makai* from Lā‘ie. According to Rice (1923) this legend, referred to as *Laniloa*, *The Mo‘o*, this point was said to have been a *mo‘o*, or a standing lizard in this case. Rice (1923) holds that this *mo‘o* was ready at any time to kill passersby. In Rice’s version of the legend, he states:

After Kana and his brother had rescued their mother from Molokai and had taken her back to Hawaii, Kana set out on a journey around the islands to kill all the *mo-o*. In due time he reached Laie, where the *mo-o* was killing many people. Kana had no difficulty in destroying this monster. Taking its head, he cut it into five pieces and threw them into the sea, where they can be seen today as the five small islands lying off Malae-kahana: Malualai, Keauakaluapaaa, Pulemoku, Mokuaaniwa and Kihewamoku.

At the spot where Kana severed the head of the *mo-o* is a deep hole which even to this day has never been fathomed (Rice 1923:112).

One might speculate that this “deep hole” is the legendary site, Wai‘āpuka (Site No. -275).

3.2 EUROPEAN CONTACT

At European Contact and shortly thereafter, the general Kahuku area was commented on by several maritime officials, with observations that point to a drastic change in land use from initial contact in the mid-1780s to the mid-1830s.

Approximately two weeks after the death of British Captain James Cook, Charles Clerke took over the helm of the H.M.S. Resolution. As the ship rounded the northern point of O‘ahu,

Captain Clerke provided the first post-Contact account of the Kahuku area. Clerke wrote on February 28, 1779:

SUNDAY 28th. . . Winds Eterly [Easterly]. fresh breezes with open Cloudy Weather. Run round the Noern [Northern] Extreme of the Isle which terminates in a low Point rather projecting; off it lay a ledge of rocks extending a full Mile into the Sea, many of them above the surface of the Water; the Country in this neighborhood is exceedingly fine and fertile; here is a large Village, in the midst of it is run up a high Pyramid doubtlessly part of a Morai. I stood into a Bay just to the Westward of this point the Eastern Shore of which was far the most beautifull [sic] Country we have yet seen among these Isles, here was a fine expanse of Low Land bounteously cloath'd with Verdure, on which were situated many large Villages and extensive plantations; at the Water side it terminated in a fine sloping, sandy Beach. . . (Beaglehole 1967:I:572 in Silva 1984:C-10).

This description paints a pleasant picture of the Kahuku area, with a thriving community and large ceremonial structures. At about the same period, H.M.S. Resolution Lieutenant, James King, described this northern tip of O'ahu, writing:

WOA'HOO. . . We saw this Island the beginning of last year, but only just as a high lump, We this Time sailed along its NE & NW sides but say nothing of its Soern [Southern] part. What we did see of this Island was by far the most beautiful country of any in the Groupe; particularly the Neck that Stretches to the No ward [Northward] and its NW side. Nothing could exceed the verdure of the hills, nor the Variety which the face of the Country display'd. It /s north-eastern/ parts were clifty, & rugg'd to the Sea side, but the Valley look'd exceedingly pleasant, near the

N point we were charmed with the narrow border full of Villages, & and Moderate hills that rose behind them (Beaglehole 1967:I:610 in Silva 1984:C-10-11).

This is yet another testimony to the beauty and lushness North Shore during the early Contact period. In contrast, Captain George Vancouver visited the northern tip of O'ahu later in 1794, discovering that the Kahuku coast had significantly changed in terms of cultivation and population, writing:

...In every other respect our examination confirmed the remark of Capt. King excepting that in point of cultivation or fertility, the country did not appear in so flourishing a state, nor to be so numerously inhabited, as he represented it to have been at that time, occasioned most probably by the constant hostilities that had existed since that period (Vancouver 1798, Vol.3:71).

Wong-Smith (1989) suggests that regular hostilities and the scourge of Western diseases caused the severe decline of the Hawaiian population in Kahuku. It was likely Captain Cook's 1778 expedition that brought venereal disease to Hawai'i and spread rapidly between the initial and secondary contact events (Kuykendall 1938; Beaglehole 1967; Lind 1968; Schmitt 1968, 1971). By the time the first missionaries conducted a census of the islands in the early 1820s, they estimated that the entire population had been reduced by nearly a third (Schmitt 1968:10 in

Wong-Smith 1989:A-10). This population crash created a wasteland out of the once verdant fields and lively villages of Kahuku.

3.3 HISTORIC ERA

The focus of this section will remain on events that greatly shaped the modern character of Kahuku, Keana, and Mālaekahana Ahupua‘a as well as any occurrences that help paint a picture of what Hawaiian cultural practices were like during this period.

3.3.1 Western Observations

Many accounts of the Kahuku, Keana, and Mālaekahana area’s early historic era were provided by missionaries. According to missionary censuses from the 1830s suggests that the area had severe declines during this time (Schmitt 1968). Ko‘olau Loa’s population in 1831 was 2,891, with 452 living in Lā‘ie. Wong-Smith (1989:A-10) notes that “a population loss of 210 for the entire district occurred between 1831 and 1835.” This population decline affected the extent of traditional agriculture in the area. In the early 1830s, E.O. Hall, of the American Board of Missions, stated in regards to Ko‘olau Loa, “Much taro land now lies waste, because the diminished population of the district does not require its cultivation” (as cited in McAllister 1933: 153). The greatest factor in the tragic population decline during this period was the introduction of Western diseases, followed by warfare (Kuykendal 1938; Nakamura 1981; Wong-Smith 1989).

The Superintendent of Secular Affairs for the Mission in Hawai‘i, Levi Chamberlain, gave an 1828 account of Mālaekahana during his second circuit of O‘ahu, where he evaluated the effectiveness of the island’s education system, provides insight on the fecundity of lands in this area. Chamberlain states:

Tuesday Feb. 5th. After breakfast I examined two schools, belonging to Laie & Malaekahana, and was pleased with the appearance of the scholars. At a quarter before 11 A.M. we set out for Kahuku, and after travelling about two hours over a level sandy country, arrived at the school house, where we found 83 scholars assembled, waiting to be examined ... A good hog had been cooked for us & when the examination closed, dinner was waiting ... my attendants made a hearty meal; and the remainder of the food was placed in the calabashes of our natives, and carried along to furnish food for us when we should be again in need (Chamberlain 1957:35-6).

Another account of Ko‘olau Loa and the project area vicinity from the late 1800s was provided by John Effinger, in an article titled, “A Tramp Around Oahu,” for *Paradise of the Pacific* magazine, where he states:

The sun had scarcely got its eyes open when I had pushed on several miles further along the grassy plain and shore through Kualoa ranch, past the ruins of the old Wilder mill, looking like an antiquated English castle, and past the Punaluu rice patches. The chimney of Kahuku mill was my guiding star this morning, and the miles seem to fly along so green is the verdure around us and so fresh the strong salt air. Sentinel cliffs, sheltering pleasant valleys where are

many of the summer residences of Honolulu's "400" shoot into the sky on the left. Chief Justice Judd Hon. P.C. Jones, and Cecil Brown, Esq. have country places along here, and when the Oahu Railway is completed, there will be an exodus from Honolulu every Saturday afternoon for a Sunday's vacation to this favored spot. The air is cool and bracing. Mosquitoes are hardly a nuisance. From Kualoa to Laie is the prettiest, healthiest part of the island of Oahu. About noon I reached Laie, a Mormon settlement, with a small cane plantation and mill. The plantation railway runs down into Laie from Kahuku plantation and all the cane is ground at the big Kahuku mill. Laie Point shoots out into the blue ocean here and the surf banging up against it throws spray high in the air. It was a few hours after noon when Kahuku mill was reached, and I took a few moments rest before pushing out for Waialua. The Kahuku stock ranch takes up all the land of this district not occupied by cane (Effinger 1895:88).

One account, which was recorded by King Kalākaua in the late 1800s, provides a very detailed description of a significant landmark of Mālaekahana, Wai'āpuka (Site No. -275). He reiterated the experiences of a group of travelers touring the area in 1885, as follows:

Entering the district of Koolouloa, and approaching the coast over a broad stretch of grassy meadow but slightly above the level of the ocean, our party was suddenly brought to a halt beside a pool of clear water, nearly round, and perhaps a hundred feet in diameter. The surface of the pool was ten or twelve feet below the level of the surrounding plain, and its even banks of solid rock dropped almost perpendicularly into water of unknown depth. The volume of the pool is affected neither by rain nor drought, and the native belief is that it is fed by springs at the bottom, and has a subterranean drainage to the ocean, some two or three miles distant.

This, we learned, was the celebrated pond of Waiapuka, around which so many strange legends have been woven. All of them speak of a cavern somewhere beyond the walls of the pool, and to be reached only by diving into the water and finding the narrow passage leading up into it.

While listening to fragments of the story of Laieikawai and of other legends connected with the mysterious cavern, and seriously doubting the existence of the secret chamber so prominently referred to in early folk-lore of Oahu, an old native, who had joined the party at Kaneohe, quietly and without a word, dismounted, divested himself of his upper garments and plunged into the pool. Swimming to the northern wall, he clung for a moment to a slight projection, and then disappeared. It was suggested for the first time that he was in search of the cavern of Laieikawai, and all eyes were turned toward the point where he was last seen above the water.

Three or four minutes elapsed, and fears for his safety began to be exchanged, when the salutation of "*aloha!*" greeted us from the opposite wall, and the next moment a pair of black eyes were seen glistening through a small opening into the cavern, not before observed, about four feet above the surface of the water.

The swimmer then returned to the pool by the passage through which he had left it, and we were compelled to admit that the cavern of Laieikawai was a reality, however wild and visionary may have been the stories connected with it. Not a single person present, including the governor, had ever before seen the passage

to the cavern attempted, and the natives were overjoyed at what they had witnessed.

To the many questions with which he was asked the old man returned but brief answers on his return, and when importuned to explain the method of his entrance to the cavern, that the secret might not be lost, he pointed significantly to the sea, and declared that there would be found thee bodies of those who sought to solve the mystery of the passage and failed (Kalākaua 1990:455-456).

This description suggests that Wai‘āpuka was not only massive, being approximately 100-feet in diameter, but also a classic sinkhole in an area known to be *karstic*, which is a geological term for limestone terrain that has been subjected to complex acidic weathering. Typically, *karstic* topography is prone to exhibiting a variety of subterranean and surficial features, including caves, tunnels, caverns, underground rivers and bodies of water, as well as sinkholes and cenotes. Unfortunately, by the time of McAllister’s (1933) island-wide survey, the site of this culturally and topographically significant feature was destroyed by being filled with sediment. Whether man or natural forces are responsible for this act has not been ascertained.

Just after the turn-of-the-Century, Andrew Adams of the Territory’s Forestry Division, reported on the agricultural and horticultural developments of Ko‘olau Loa, stating:

Mr. Andrew Adams, District Forester for the Koolauloa District, desired that no formal report for him be published but in correspondence he stated that “The Plantation is constantly planting Ironwood trees, which are thriving, but no systematic effort has been made toward forest planting, in fact the little planting that has been done could scarcely be dignified by the term ‘forestation.’ There are no forest nurseries, except several boxes on the premises of the head luna and my own where Iron wood trees are started from seeds.

The native forest in the mountains is in good condition, and the Koa, of which there is a good belt between Malaekahana and Kaipapau valleys, is vigorous and thriving. The insect usually preying upon the Koa is not so much in evidence in this forest, it appears to me, as formerly, and there are many young Koas springing up; some of this is sizeable timber, but I doubt if it could ever be lumbered without great destruction to the surrounding forest, and especially the undergrowth, because of the almost inaccessible ridges on which the Koa stands (Adams 1905:90-91).

3.3.2 Cultural Practices

Although the spread of Western ideals and lifestyles was rampant at this time, there are several instances of Hawaiian traditional practices taking place in Kahuku. *Hula* and *mele* performances held in Kahuku in 1844 and 1849 were described by Emerson (1998). The first performance, a *hula*, called the Hula O-Niu, which took place in 1844 was described by Emerson (1998) as such:

The so-called hula *o-niu* is not to be classed with the regular dances of the halau. It was rather a popular sport, in which men and women capered about in an informal dance while the players engaged in a competitive game of top-spinning. The instrument of sport was made from the lower pointed half of an oval coconut shell, or from the corresponding part of a small gourd. The sport was

conducted in the presence of a mixed gathering of people amid the enthusiasm and boisterous effervescence which betting always greatly stimulated in Hawaii.

The players were divided into two sides of equal number, and each player had before him a plank, slightly hollowed in the center – like the board on which the Hawaiians pounded their poi – to be used as the bed for spinning his top. The naked hand, unaided by whip or string, was used to impart to the rude top a spinning motion and at the same time the necessary projectile force – a balancing of forces that called for nice adjustment, lest the whirling thing reel too far to one side or run wild and fly its smooth bed. Victory was declared and the wager given to the player whose top spun the longest.

The feature that most interests us is the singing, or cantillation, of the oli. In a dance and game of this sort, which the author's informant witnessed at Kahuku, Oahu, in 1844, one contestant on each side, in turn, cantillated an oli during the performance of the game and the dance (Emerson 1998:248).

The later performance, a *mele* about Kāne, recorded by Emerson (1998) took place in 1849 was viewed by King Kamehameha III's during his circuit around the island of O'ahu. Emerson (1998) wrote:

The author has already hinted at the form and character of the entertainments with which hula-folk sometimes beguiled their professional interludes. Fortunately the author is able to illustrate by means of song the very form of entertainment they provided for themselves on such an occasion. The following mele, cantillated with an accompaniment of expressive gesture, is one that was actually given at an awa-drinking bout indulged in by hula-folk. The author has an account of its recital at Kahuku, island of Oahu, so late as the year 1849, during a circuit of that island made by King Kamehameha III. This mele is reckoned as belonging to the ordinary repertory of the hula; but to which particular form of the dance it was devoted has not been learned...(Emerson 1998:129-130).

The fact that this performance was part of King Kamehameha III's circuit and recorded with such detail and contemplation by Emerson (1998), suggests that this unnamed *hula hālau* was no ordinary one. It is possible that this Kahuku *halau* has a long, but unrecorded history.

In terms of traditional agricultural practices, Handy (1940; as cited by Barrera 1981) maintain that Kahuku had a few areas that traditional Hawaiian farming methods may have taken place. They state the following about agriculture in Kahuku Ahupua'a:

Inland from the Kahuku ranch house is Kaainapele Spring. Terrace symbols are shown south of the ranch house (U.S.G.S. topographic map, 1917), but Judge Rathburn says that these flats were built by Chinese before 1890 for rice paddies. They were irrigated with artesian water, but the water turned brackish and the paddies were abandoned. They were never used for taro. The 1917 map shows extensive terrace areas in the swampland seaward of the Oahu Railway, stretching 15 miles south of Kukio Pond. These were originally terraces, were later planted to rice, and are now under sugar cane. According to John Kaleo, there is a small group of terraces, south of this swampland, named Kaukana. North of Kukio Pond was also a small area. It is reported that there were no

terraces up Kahuku Stream or Kaohiaae, its upland branch. Kaleo names 11 localities where terraces were formerly cultivated (as cited in Barrera 1981:13-14).

However, Handy and Handy (1940) stated that there were no terraces in Keana's stream or on the lowland plains. They also hold that, Kaleo, their informant for the area, knew of agricultural terraces in Kaukanalaau Stream.

3.3.3 Land Court Awards

Private land ownership was established in Hawai'i with the Māhele 'Āina, also known as the Great Māhele of 1848. Crown and *ali'i* lands were awarded in 1848 and *kuleana* titles were awarded to the general populace in 1850 (Chinen 1958). Awarded lands in this process are referred to as Land Commission Awards (LCAs). Over time, government lands were sold off to pay government expenses. The purchasers of these lands were awarded Grants or Royal Patent Grants (Chinen 1958). LCA's offer the native and foreign testimonies recorded during the claiming process, which shed light on what the land use of the area was in the early historic period. This information can be used to predict the types of resources may still be present in the project area.

In total, 86 LCAs and one Grant were identified within an approximate two kilometer radius around the Nā Pua Makani Project lands. A list of these properties by *ahupua'a* is provided in Table 1. Figure 4 and Figure 5 show the project area on TMK maps. The LCAs are described in Native Register (NR) comments and Foreign Testimonies (FT) submitted during the Māhele 'Āina and provide a narrative on traditional use of land within each *ahupua'a*.

Table 1. Land Court Awards (LCA) in or Near the Nā Pua Makani Wind Project Area

LCA	Ahupua'a	Claimant	Testimony	Book	TMK Map
2691:1 & 2	Kahuku	Laumea	8 <i>lo'i</i> , 2 watercourses (' <i>auwai</i> ?), <i>kula</i> lands and shore area, <i>wauke</i> gardens, banana plantation (a mountain land), 3 <i>koa</i> trees, 2 <i>hala</i> trees, 1 <i>kukui</i> tree, houselot	NR v. 3, 592 FT v. 10, 169	5-6-004
2702:1	Kahuku	Waiaulaa	<i>Kula</i> lands planted with melons, spring, houselot with wooden fence	NR v.3, 598 FT v.10, 188	5-6-002
2704	Kahuku	Hau	1 <i>wiliwili</i> tree	-	-
2723:3	Kahuku	Puu	6 <i>lo'i</i> , <i>kula</i> land, houselot	NR v. 3, 607 FT v. 10, 166	5-6-002
2729:1	Kahuku	Polena	2 ' <i>awa</i> gardens, 1 breadfruit garden, 1 ' <i>ōhi'a</i> garden	-	5-6-004
2732	Kahuku	Pukawale	2 <i>wauke</i> gardens, 2 <i>koa</i> canoe trees	-	-
2785	Kahuku	Makakiekie	1 ' <i>awa</i> , 5 <i>koa</i> canoe trees	-	-
2787	Kahuku	Makaokalai	1 <i>mala</i> of ' <i>awa</i>	-	5-6-004
2880:1	Kahuku	Kupau	2 <i>mala noni</i> , 2 <i>mala</i> of <i>wauke</i> , 2 <i>koa</i> canoe trees	-	5-6-004
2872:1 & 2	Kahuku	Kaihikapu	18 <i>lo'i kalo</i> , <i>kula</i> lands, salt land, shore land, mountain land, <i>mala</i> of <i>wauke</i> , <i>mala</i> of sweet potato, houselot	NR v. 3, 672 FT v. 10, 154	5-6-004
2887:1 & 2	Kahuku	Keawe	3 <i>lo'i</i> , <i>kula</i> land, a <i>mala</i> of ' <i>awa</i> , houselot	NR v. 3, 678 FT v. 10, 171	5-6-002 5-6-004
2916:1 & 2	Kahuku	Kaluau	5 <i>lo'i kalo</i> , watercourse (' <i>auwai</i> ?), <i>mala</i> of <i>wauke</i> , <i>mala</i> of ' <i>olena</i> , a <i>kuahiwi</i> , <i>kula</i> lands, houselot	NR v. 3, 692 FT v. 10, 168	5-6-004

LCA	Ahupua'a	Claimant	Testimony	Book	TMK Map
2918:1 & 2	Kahuku	Kawaa	1 <i>lo'i</i> , houselot	NR v. 3, 692 FT v.10, 182	5-6-002 5-6-004
3723:1	Kahuku	Male	9 <i>lo'i</i> , <i>kula</i> lands, houselot	NR v. 4, 156 FT v. 10, 171 NT v. 4, 368	5-6-002
4391:1 & 2	Kahuku and Keana	Kalawaiamanu	3 ' <i>ili weuweu</i> , 1 ' <i>ili</i> of sweet potato, 1 ' <i>ili</i> of <i>wauke</i> , 1 <i>kula</i> , sugarcane and <i>wauke</i> , breadfruit, <i>noni</i> , ' <i>awa</i> and banana, tobacco, houselot	NR v. 4, 292 FT v. 10, 184	5-6-006
4422:2	Kahuku	Kaumualii	10 <i>lo'i</i> , <i>kula</i> land with <i>wauke</i> , sweet potato, <i>hala</i> , salt land, a <i>mala</i> of <i>noni</i> , banana, watermelon, houselot	NR v. 4, 296 FT v. 10, 164	5-6-005
4458:1	Kahuku	Kaihupailani	5 <i>lo'i</i> <i>kalo</i> , <i>kula</i> lands, <i>kula</i> of <i>wauke</i> , wooded upland, <i>koa</i> tree, <i>kukui</i> tree, houselot	NR v. 4, 303 FT v. 10, 203	5-6-004
4558:1	Kahuku	-	Awarded on island of Kaua'i.	-	5-6-004
Grant 550	Kahuku and Keana	C. G. Hopkins	no specifics on land use	-	5-6-006
3712	Keana	Moku	1 houselot	NR v. 4,153 FT v. 10, 175 Not awarded to Moku, but awarded to Kinimaka	-
4392:1	Keana	Kalawaiamanu	no specifics on land use	-	5-5-002
7130	Keana	Kinimaka	As <i>Konohiki</i> , awarded entire <i>ahupua'a</i> ; no specifics on land use	-	5-5-006
4631:3	Mālaekahana & Lā'iewai	Kii	2 <i>lo'i</i> <i>kalo</i> , 2 <i>lo'i</i> , 1 <i>kula</i> , 4 ' <i>ili</i> <i>wauke</i> , 5 ' <i>ili</i> ' <i>uala</i> , 1 ' <i>ili</i> watermelon, 1 wooded upland, <i>pali</i> ' <i>uala</i> [sweet potato, cliff plantings], 1 ' <i>apu'apu</i> ' <i>uala</i> , [sweet potato, pit plantings], 1 watercourse (' <i>auwai</i> ?)	-	5-5-005
8452	Mālaekahana	A. Keohokalole	Entire <i>ahupua'a</i>	-	-

LCA Awards in Kahuku Ahupua'a

While King Kamehameha III, under the name of Victoria Kamamalu, retained the entire *ahupua'a* of Kahuku as part of Crown Lands, the land rights of its tenants amounted to 4,752 acres (Indices 1929:27-8 as cited by Wong-Smith 1989:A-11). According to Rechtman (2009:15), "...eighty-five claims for Land Commission Award (LCAw.) parcels were made within the *ahupua'a* of Kahuku, but only seventy-two *kuleana* lots were awarded to native tenants. Nearly all of awards were located makai of the present day highway..." A total of 18 LCA claims were located within two kilometers of the Nā Pua Makani Project lands.

The following are claims for lands either within or partially within Kahuku Ahupua'a. These claims provide a narrative on traditional use of *kula* and *wao* lands.

No. 2887: Keawe (claimant), Kahuku, Oahu
January 5, 1848

To the Land Commissioners, Respectful Greetings: I, Keawe, hereby state my claim for land at Kahuku. The name of the *mo'o* is Luahime. There are three *lo'i*, bounded on the north by Kawaa's [land] on the east by Kaluau's [land], on the south by *lo'i* ko '*ele*, on the west by Paukoa's [land]. A *mala* of sweet potato is at

Ahamau, and at Keana I have a *mala* of 'awa. My houselot is Kahuku, and is surrounded by *kula*. My right of occupancy is from the time of Kamehameha I. KEAWE x his mark

No. 2729: Polena (claimant), Kahuku, Oahu
January 4, 1848

To the Land Commissioners, respectful greetings: I, Polena, hereby state my claim for land at Kahuku. The name of the *mo'o* is Luahine. There are seventeen *lo'i* bounded on the north by the *kula*, on the east by Kaihikapu's land, on the south by Kaluau's land, on the west by Maui's land. Three are cultivated *kulas* named Uwalapahupahu, Mamakaloa and Luahine. There is a sea shore land, named Puhikaawe. At Keana are two 'awa gardens, and a garden of breadfruit and 'ōhi'a. My houselot is at Kahuku and is bounded on the north east and west by a *kula*, on the south by a salt bed. My right of occupancy is from the time of Kamehameha I. POLENA X his mark

No. 2704: Haui (claimant), Kahuku, Oahu
January 4, 1848

To the Land Commissioners, respectful greeting: I, Haui, hereby state my claim for land at Kahuku. The name of the *mo'o* is Kuapuu; there are six *lo'i* and the watercourse, bounded on the north by a *kula*, on the east by Kekipi's, on the south by Makilo'o, on the west by Kueulu's. There is a *kula* land, Ahamau, a fish pond named Kuhiwa, and a *lo'i* at Kii. At Keana I have a *wiliwili* tree. My right of occupancy was from the time of Kamehameha I. HAUI X his mark

No. 2732: Pukawale (claimant), Kahuku, Oahu
January 4, 1848

To the Land Commissioners, respectful Greetings: I, Pukawale, hereby state my claim for land at Kahuku, a *mo'o* named Kuha. There are five *lo'i*, bounded on the north by those of Makakiekie, on the east by a *kula*, on the south by Maui's [*lo'i*], on the west by Kupaikia's [*lo'i*]. There is a shore area-the name of the sea [fishery] is Keekee, [and] a mountain area. At Makapala are two *lo'i*, bounded on the north by Umeume's, on the east by Kupau's, on the south by a *kula*, on the west by a *ko'ele lo'i*. There is a cultivated *kula* named Makapala, another *kula* is Mauiloa, and there is another valley or [gulch]. At Keana are two *wauke* gardens and two *koa* canoe trees. My houselot is at Kahuku and it is surrounded by *kula*. I have had the right of occupancy since the time of Kamehameha I. PUKAWAKE X his mark

No. 2785: Makakiekie (claimant), Kahuku, Oahu
January 1, 1848

To the Land Commissioners, Respectful Greetings: I, Makakiekie, hereby state my claim for land at Kahuku. The name of the *mo'o* is Puulu. There are seven *lo'i*, bounded on the north by those of Keakaokawai, on the east by a *kula*, on the south by Pukawale's [land], on the west by Kupaihea's [land]. One *lo'i* and the watercourse adjoins those of Maui and Kuapuhi and *kula*. There is *kula* land at Kawelohale and Kii, two clusters of *hala* trees. At Ahamau are some gardens of sweet potato and gourd. There is a shore area called Kaohana. In the upland are

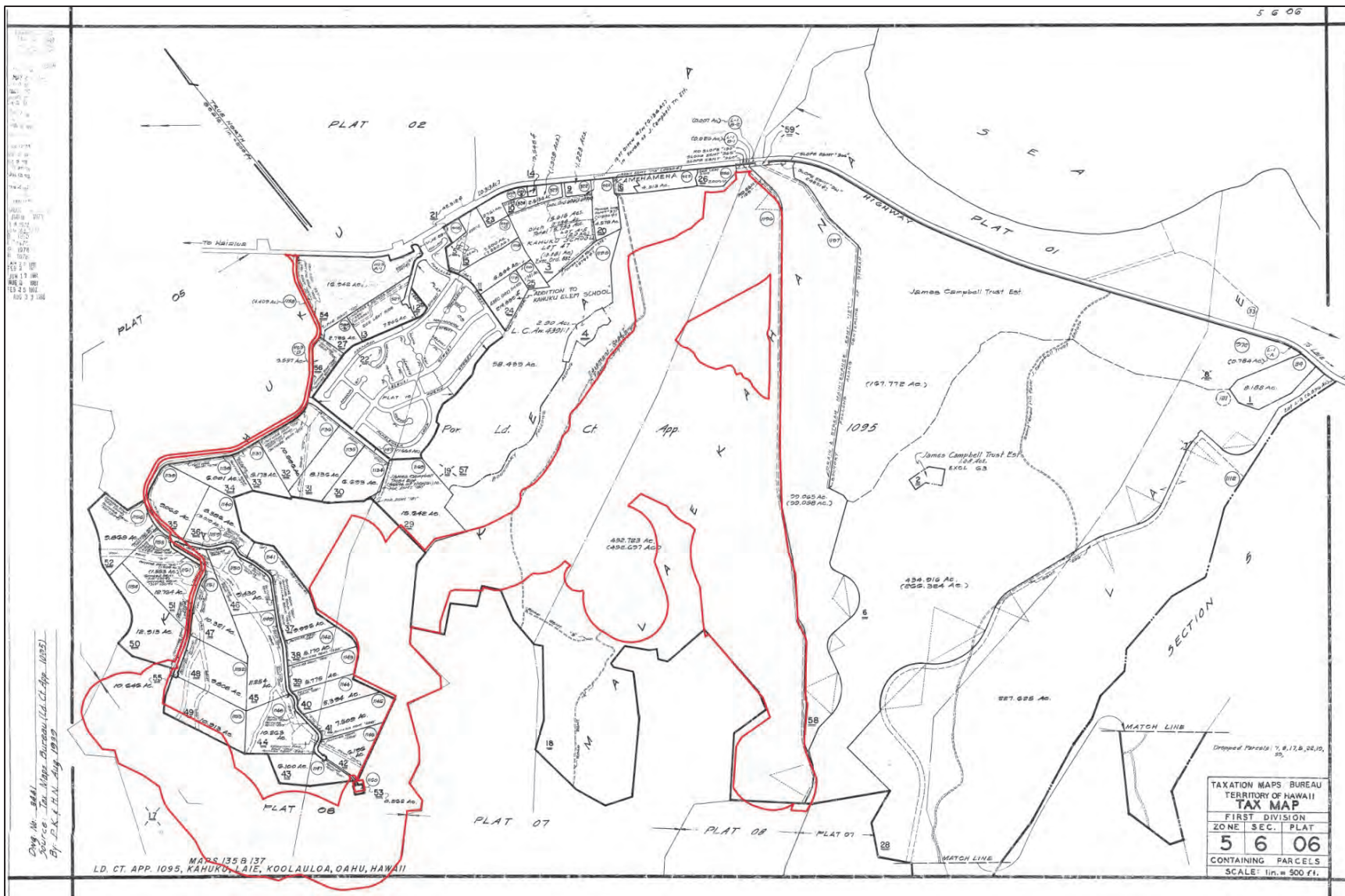


Figure 4. Project area depicted on TMK Map.

DRAFT - Archaeological Inventory Survey
Proposed Nā Pua Makani Wind Project
Kahuku, Keana, and Mālaekahana Ahupua'a, Ko'olau Loa District
April 2015

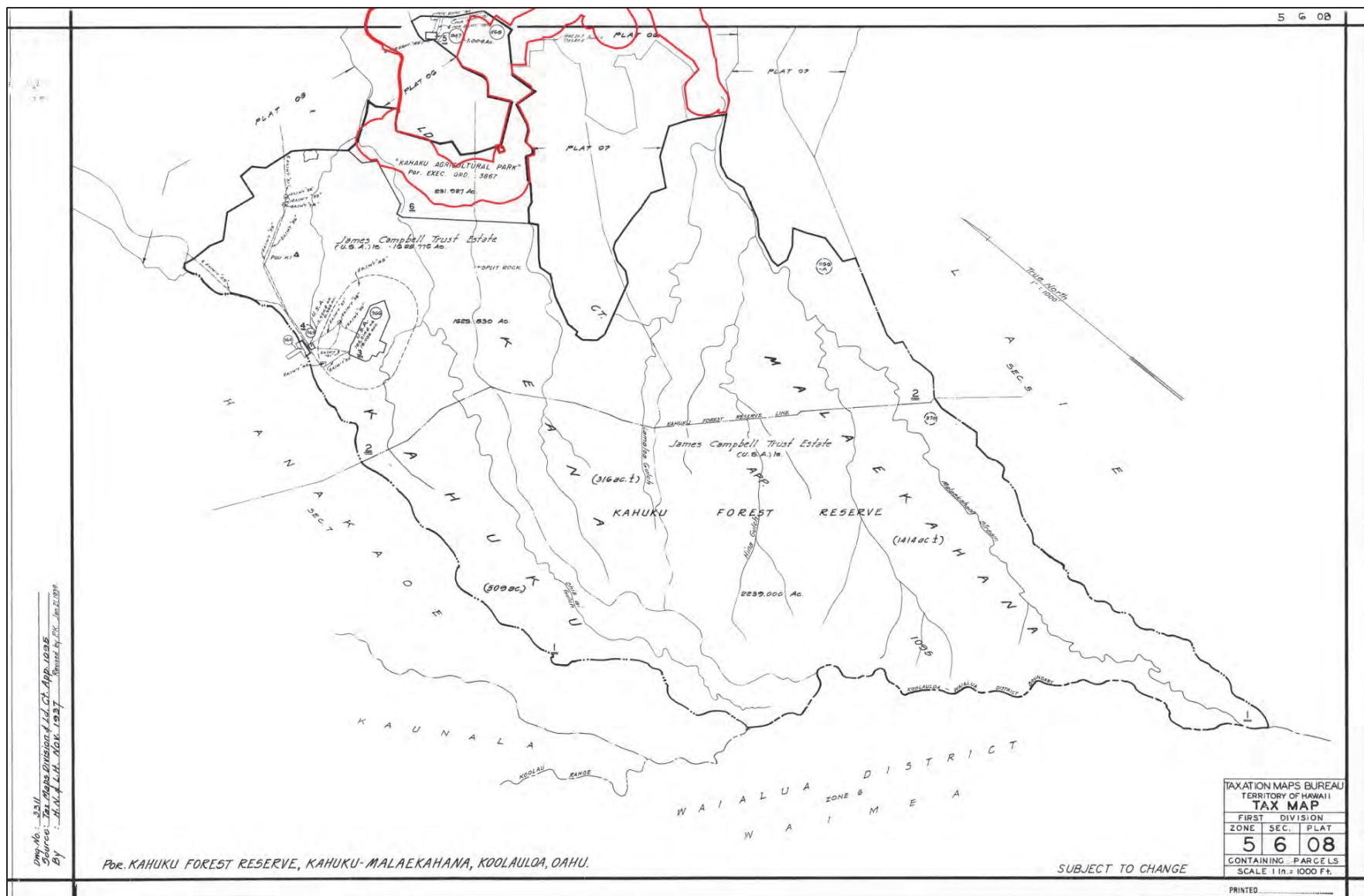


Figure 5. Project area depicted on TMK Map.

some gardens of *wauke*, *‘awa* and *noni*, and seven *koa* canoe trees. In another place is a watercourse adjoining Maui's. At Keana are one *‘awa* garden, and five *koa* canoe trees. There is a mountain land, Kalapaweo. My house claim is at Kahuku, bounded on all sides by the *kula*. There is a fish pond for me, close to my house. My right of occupancy is from the time of Kamehameha I. MAKAKIEKIE X his mark

No. 2787: Makaokalai (claimant), Kahuku, Oahu
January 4, 1848

To the Land Commissioners, Respectful Greetings: I, Makaokalai, hereby state my claim for land at Kahuku. At Luahine is one *lo‘i* and two watercourses bounded on the north by Kawaa's [land], on the east by a *lo‘i ko‘ele*, on the south by Keino's [land], on the west by Kawaa's [land]. There is also another *lo‘i*, adjoining that at Akaihupiiilani. There is a fishpond named Kumuhakane. There is also another area, Hanumoha. There are two gardens of sweet potato and *wauke*. There are two *‘awa* gardens. There are four *koa* canoe trees. At Keana are two *‘awa* garden and three *koa* trees. My houselot is at Kahuku bounded on all sides by the *kula*. My right of occupancy is from the time of Kamehameha. MAKAKALAI X his mark

LCA Awards in Keana Ahupua‘a

A total of ten LCA claims were recorded for Keana Ahupua‘a, either totally within or partially within the *ahupua‘a*. Of these claims, two LCA were awarded. The *ahupua‘a konohiki* (overseer), Kinimaka was closely affiliated with Kamehameha III, which may have helped secure his claim to the entire *ahupua‘a*. According to O'Hare et al. 2008, "He was a *makua hanai* (adopted parent) to David Kalākaua, sixth king of Hawai‘i. Kinimaka retained one-half of the *ahupua‘a*, giving back the other half to pay his commutation fees for the properties that he retained. This second half became part of the government lands" (O'Hare et al. 2008:19).

Environmental conditions would partly explain for the dearth of claims for this *ahupua‘a*, as these lands were not suited for most traditional methods of farming. While the coastal areas of Keana appeared to be largely brackish water swamp and/or sand with outcrops of limestone, the uplands were relatively dry and rocky - not suitable for terrace farming. This was expressed by the sentiments of Kaleo, E. C. Handy's trusted informant, as they recorded traditional land use on O‘ahu in the 1940s. He maintained that he knew of no agricultural terraces up the stream, nor of any on the plains of Keana (Handy 1940). This was later upheld in Handy and Handy (1991:462), who stated the following about Mālaekahana and Keana:

These two small *ahupua‘a* intervening between La‘ie and Kahuku (the northernmost tip of Oahu) show much the same pattern, in miniature, of dune coasts, elevated coral, and broken level land seaward from the hills. Each has a small stream. There were formerly some irrigated terraces in Mālaekahana (Wayclear-for-work), but not in Keana (The-cave) (as cited by O'Hare et al. 2008:19).

A total of four LCA claims were located within two kilometers of the Nā Pua Makani Project lands. The following are claims for lands either within or partially within Keana Ahupua‘a. These claims provide a narrative on traditional use of Keana's *kula* and *wao* lands.

No. 4329B: Kuapuhi (claimant), Keana, O'ahu
January 1, 1847
N.R. 277v4 [Listed as 4392]

To the Land Commissioners, Greetings: I, Kuapuhi, am a claimant at Konikaa, of three 'ili of sweet potatoes, bounded on the north and south by pali, on the east by Kahulihana; on the west by Maii; My house and the kula are in my mo'o. My right of occupancy is from the time of Kamehameha I.
KUAPUHI X, his mark

F.T. 185v10

No. 4392: Kuapuhi [should be 4329B]

Kalawaiamanu, sworn says he knows the land of Kuapuhi in Keana. It consists of a piece of cultivated kula land, planted with potatoes. This piece may contain a quarter of an acre and is bounded:

On Hauula side by a pali
Mauka and Waialua side[s] by the konohiki
Makai by Kalawaiamanu's land.

Claimant's house lot is makai of his land and is enclosed with a stone wall. He has held the land for over 20 years. The konohiki consented to the claim for the piece of kula and house site.

[Award 4329B; R.P. 6247; Keana Koolauloa; 2 ap.; .71 Ac.; Award 4392 contains the documents for this award]

No. 4391: Kalawaiamanu (claimant), Keana, Oahu
January 3, 1848

To the Land Commissioners, Greetings: I, Kalawaiamanu, am a claimant in the 'ili in Louana. There are three 'ili weuweu, one 'ili of sweet potato, one 'ili of wauke, bounded on the north by the kula, on the east and west by sugarcane, on the south by the pali. Here are the jump lands: At Halulu is sugarcane, wauke. At Kahalau is breadfruit and noni. At Keaaulu is a breadfruit, and noni. At Kapuou is noni. At Kealahaka is 'awa, sugar cane, and banana. At Paos is 'awa. At Uumhalu is a kula planted in sweet potato and watermelon. My house is at Nonoula. My right of occupancy is from the time of Kamehameha II.
KALAWAIMANU

No. 3712: Moku (claimant), Keana, Oahu
January 10, 1848
N.R. 153v4

To the Land Commissioners, Greetings and Peace: I, Moku, hereby state my chum for land at Keana. One mala is at Paeloa. One mala is at Aahupalua. At Malekahana I have one mala. At Kawaiu is one mala. At Makanikeoloi, an upland, is a mala of 'awa and wauke. One mala is at Paaulani. One mala is at Aewai. At Laie I have a portion of a lo'i adjoining Kahalelaau's. At Kahuku I have one lo'i at Mookini, adjoining Kiha's lo'is [sic]. A watercourse is at Luahine. My house claim is at Keana, surrounded by my kula. My right of occupancy was from Kamehameha III. MOKU

F.T. 175v10

Claim 3712: Moku

Kiha, sworn, says Moku left this part of the country some 5 months ago and went to live on Hawaii. Witness knows the *kalo* patch claimed by Moku in Kahuku. It is not planted.

(It was stated by several present that Moku had given up the pieces of land in this Claim, and no one appeared to represent him).

The Konohiki claims this land.

[No. 3712 not awarded]

LCA Awards in Mālaekahana Ahupua‘a (in the Vicinity of Nā Pua Makani Project Area)

A total of 21 land claims were made for the *ahupua‘a* of Mālaekahana, yet only six were awarded with one award being the entire *ahupua‘a*. The LCA claims suggest that traditional agricultural practices occurred in Mālaekahana, but was limited to dryland cultivation as well as gathering of plant resources, while wetland agricultures was practicing in adjacent Lā‘ie (Hammatt 1996). Land use as indicated in Mālaekahana LCA claims is described by Hammatt (1996) as follows:

In 1850 the *ahupua‘a* of Mālaekahana (3280 Acres) is claimed by A. Keohokalole, mother of King Kalākaua, Queen Liliu‘okalani, Miriam Likelike Cleghorn and Wm. Pitt Leleiohoku (II) and is awarded to her in 1854. Of 21 claims for land parcels (*apana*) in Mālaekahana only four *kuleana* claims are awarded. There are no claims for *lo‘i* in Mālaekahana. The claims often state that the area jumps around and goes from sea to mountain and therefore boundaries can’t be given. The claims for Mālaekahana mention 15 *kula*, 6 *mala*, and 1 *mo‘o* with no crop given, 12 *wauke* patches, 7 house sites, 6 banana patches, 3 potato patches, 5 koa trees for canoe making, and 1 *mala* each for *hala*, *noni*, *ti*, *hau*, breadfruit and tobacco. Two mountain areas are also claimed. Two house sites, 1 banana and potato land, and 1 *wauke* land are awarded. However, no present maps show where these awards were located. The old Mālaekahana maps at the State Survey office are missing (as reported by the survey office to Dr. V. Creed on 2/2/96). Tax maps do not show the location of these few awards (Hammatt 1996:4-5).

After exhausting all available historic maps for Mālaekahana during this documentary research, no maps were found depicting the Mālaekahana LCA locations. Other than the entire *ahupua‘a* (awarded to Ane Keohokalole), only one LCA claim, partially in both the Mālaekahana and Lā‘iewai Ahupua‘a, was located within two kilometers of the Nā Pua Makani Project lands.

The succeeding sample of Mālaekahana and Lā‘iewai LCA claims provide insights on the area’s traditional land use.

No. 8537: Kahawaii (claimant deceased), Mālaekahana, Oahu

LCA 8537 AWARDEE Kahawaii (Deceased) – Kuhapa, sworn, says he knows the land claimed by Kahawaii in Mālaekahana. Part of it is planted in *wauke*. This part is bounded on all sides by the Konohiki’s lands. The house site of claimant is not enclosed. Claimant held land from his youth. He died last April (1840). His

wife is his heir. Paakahi, sworn, says he knows of 3 kalo patches claimed by Kahawai in Laie. The Konohiki took this land away because claimant did not got he [sic] poalima. The konohiki of Malaekahana consented to this claim.

No. 7727: Paukoa (claimant deceased), Mālaekahana, Oahu

LCA 7727 AWARDEE Paukoa (Deceased) – Kuhapa, sworn, ...in Malaekahana. Part of it has been given up to the Konohiki by claimant's widow. The portion retained by her is planted with wauke. It is bounded on the Hauula side by Kahoowaha's land, Mauka by Kuhapa's land, Waialua side by Kananui's land, makai by Nawai's land. Paukoa died in the present year.

No. 8355: Kakau (claimant), Mālaekahana, Oahu

LCA 8355 AWARDEE Kakau - ...is not presently cultivated. Part of it was planted last year with bananas, wauke (about half an acre). Claimant occupied these lands since the time of Kamehameha I...

No. 3861: 2&3: Pulehu (claimant), Lā'ie, Oahu
January 5, 1848

To the Land Commissioners, Greetings: I hereby state the claim for my land. Kahikiea is the *mo'o*. There are five taro *lo'i* at Kahikiea. One *lo'i* is at Kaholo, one *lo'i* is at Paakea. One '*ili weawe*a [grass or herbage], one *mo'o* is at Malaekahana. One '*ili* of sweet potatoes is at Omao. The right of my *makuas* was from Liholiho.

Foreign Testimony V. 11:263

No. 3861 Pulehu

Kauaikaua, sworn says, he knows the land claimed by Pulehu in Laie. It consists of 6 *kalo* patches, a piece of *kula* land and a House site. The 6 patches are bounded on Hauula side by Kahalelaau's land, Mauka and Waialua side by the Konohiki, Makai by Kii's land. The *kula* land is planted with *wauke* - contains about half an acre - surrounded by the Konohiki. The house site is not enclosed, there is one house on it. Claimant has held the land for 30 years. The Konohiki's agent consented to this claim.

No. 4003:3: Hano (claimant), Lā'ie, Oahu
January 5, 1848

Native Register V. 4:208
January 5, 1848

To the Land Commissioners, Greetings: I, Hano am a claimant of land at Laie. In the '*ili* of Paoo are three *lo'i*, one *kula*, one *kai* / fishery / one mountain area. The boundaries are: on the north, *muliwai* land of Poouahi, on the east, land of Kaaipuaa, on the south, land of Kauwaiawa, on the west, land of Palii. Here are the scattered claims: In the '*ili* or the *ahupua'a*, six *lo'i*, ten *kula*. Seaward of the mountain, one house lot. In the '*ili* of Kapuna, one *lo'i*, two *kula*. Because these claims are so very scattered, therefore it is not practical to describe their boundaries to you, the Land Commissioners. My right of occupancy at these places is from the time of Kamehameha 1 until the reign of Kamehameha III at this time.

Foreign Testimony V. 11:277
No. 4003 Hano

Kauaiamanu, sworn says, he knows the land-claimed by Hano in Laie. It consists of 3 *kalo* patches, a piece of *kula* land, and a House lot. The 3 patches are bounded on Hauula side by Maii's land, Mauka by Hoanauli's land, - Waialua side by Kaluaiaawa's land. - Makai by Kauaiamanu's land. The *kula* land is planted with tobacco & bananas. It is bounded on Hauula side by Kauaiamanu's land, - Mauka by Napahu's land, -Waialua and Makai by the Konohiki. The house lot is in another place. It is not enclosed. Claimant has held the land for 9 years. The konohiki's agent had no other objection to the claim

No. 4343:2: Kauaiomono (claimant), Lā'ie, Oahu
January 3, 1848

Native Register V. 4:267
January 3, 1848

To the Land Commissioners, Greetings: I, Kauaiomono, am a claimant at Laie for four *lo'i* and one *kula*. The boundaries are: north, the land of Pupukea, east, Kalakee's /land/, south, the land of Napaeko, west, the land of Hano. The scattered *lo'is* and *kulas* are as follows: Kalawa, one *lo'i*, no *kula*. Kapaakea, four *lo'i*, three *kula*. Kaholi, no *lo'i*, no *kula*. Kahikiea no *lo'i*, two *kula*. Kumupali, no *lo'i*, one *kula*. My right of occupancy is from my *kupunas* until the present.

Foreign Testimony V. 11:298
No. 4343 Kauaiomono

Kauaikaua, sworn says, he knows-the land of claimant in Laie. It consists of 12 *kalo* patches, 7 of which are planted, a piece of *kula* land and a house site. 5 of the patches have not been planted for two years. The 7 *kalo* patches which are planted are bounded on Hauula side by Kaleo's land, -Mauka by Elemakule's land, · Waialua side by the Konohiki, -Makai by Kamamai's land. The *kula* land is bounded on Hauula side by Pulehu's land, - Mauka by Kaleo's land, Waialua side by the land of Malaekahana, - Makai by Kamamai's land. It is planted with *wauke*. The house site is separate- not enclosed. Claimant derived the land from his ancestors. The Konohiki's agent had no other objection to this claim ...

No. 4361:3: Kii (claimant), Lā'ie, Oahu
January 3, 1848

Native Register V. 4:271 Laie wai, Oahu
January 3, 1848

To the Land Commissioners, Greetings: I, Kii.am 1 claimant of land in the 'ili of Kahikea. There are two taro *lo'i*, a *kula* and a wooded upland named Omao. The boundaries are: north, Napilipili, east, Kaiwikkole, west, a stream, south, Kapaakea. Here are the scattered claims: At Puhahaka is one 'ili of *wauke*. At Namahana, is one 'ili of *wauke* and a *pali uala*; [steep planting of sweet potatoes]. At Keanahale is one 'ili of *wauke* and an *apuapu'uala*. At Noholua are two *lo'i* and a watercourse. At Paakea is one 'ili of *wauke*, two 'ili of sweet potato, and, 'ili of watermelon. At Malaekahana is one 'ili of sweet potato. Malaekahana is a

separate *ahupua'a*. Also, my house is at Paakea. My occupancy has been from the reign of Kamehameha 3 [sic]

Foreign Testimony V. 11:300
No. 4361 Kii

Kupehia, sworn says, he knows the land claimed by Kii in Laie. It consists of 2 *kalo* patches, a piece of *kula* land and a house site. The 3 patches are bounded on Hauula side by Kahalelaau's land, - Maauga by Pulehua's, - Waialua side by the Konohiki, - Makai by Mahoe's land. The *kula* land is bounded on Hauula side by Kauaiomano's, - Mauka and Makai by the *konohiki*, - Waialua side by Kauikaua's land. The house site is distinct from the land - not enclosed. Claimant has held his land for over ten years. The land claimed in Malaekahana is *nahelehele*. The agent of the Konohiki of Laie had no objections to this claim.

3.3.4 Historic Agriculture, Religion, Developments, and Military Land Use

The Kahuku Ranch

According to Rechtman (2009), prior to Campbell's ownership, Charles Gordon Hopkins obtained the *ahupua'a* of Kahuku in 1851 as part of Grant No. 550 and founded a ranch at Kahuku.

The result of these developments were not all positive, as suggested by Emerson (1928), where he writes that the tyranny of the new land owners had caused the Native population of Kahuku to suffer, on which he elaborates:

Kahuku had passed from control of its chief to that of an Englishman. The pastures of his big ranch extended along the shore for 12 miles, reaching inland to the mountain chain, and he was so autocratic that the natives could not own a dog, or pasture a cow or horse, without his consent. The depredations of herds and flocks on their small homesteads became unbearable, but they appealed in vain for their beloved *hala* trees and patches of vegetables. . . There was no redress, however, and with the fading of the forests the people also disappeared and the once populous district of Kahuku became a lonely sheep and cattle ranch (Emerson 1928:135-136 as cited in Rechtman 2009).

The 25,000 acre property in Kahuku that would become Kahuku Ranch had passed through a series of hands before it was purchased by James Campbell for \$63,500 cash in the mid-1870s. Campbell then stocked this ranch with 3,000 head of cattle as well as a number of sheep and horses he hoped would reach 30,000 (Silva 1984:C-16).

The Kahuku Plantation

By the late 1890s, Campbell had leased a large portion of his ranch lands to James B. Castle, which would become the Kahuku Plantation. The plantation proved to be innovative both socially and economically. In the early 1900s, the Hawaiian Sugar Planters' Association became a recognized organization that aimed to improve general working and living conditions of plantation workers. Kahuku Plantation became a pioneer in the movement, providing a day-care center for the working mothers beginning in 1905 (Thrum 1921:116). The plantation had also developed a new fuel-saving device that burnt waste molasses, creating an ash that was

then used as a high grade fertilizer (ibid.). By the mid-1930s, the plantation was cultivating nearly 4,500 acres and had 1,137 people under its employ (O'Hare and Hammatt 2006:21). With its heyday long over, the Kahuku Plantation shut its doors in 1971, causing the greater Kahuku area to experience economic instability for years.

During the plantation's operation, water was an extremely valued resource in the Kahuku and Keana area. Prior to the plantation, traditional agricultural methods relied on seasonal rains, the area's few springs, and intermittent streams. Thus, the plantation began pumping spring water, stream water, and rain to irrigate the sugarcane, but "...these sources were found to be insufficient. Thereafter, the company resorted to artesian wells, which came to be the main source of water" (Kuykendall 1967:69).

Religion and Religious Developments in Kahuku, Keana, and Mālaekahana Ahupua'a

Western religions in Kahuku during the late 1800s were jostling to gain the loyalty of the community. In the 1878 *Annual Report of the Hawaiian Evangelical Association*, Kahuku Church, which eventually merged with Hau'ula Church, was one of the last Hawaiian speaking Evangelical churches on the island (Hawaiian Evangelical Association 1878:2). This church is later described in this report as "one of the feeble churches," to the point that, "its pastor has been called to Waianae, and installed over that church...It would be well for this church to unite with some stronger one..." (Hawaiian Evangelical Association 1878:10).

The Church of Jesus Christ of Latter Day Saints gained the majority of Lā'ie and Mālaekahana's faith in as early as 1850, when Mormon missionaries initially settled in the area. According to Ahlo and Hommon (1981), the Mormon Church purchased approximately 6,000 acres in the area for farming. Of these lands, approximately 1,500 acres of which were ideal for agriculture. Crops that were initially cultivated on these lands, but by the end of the 19th century pineapple and sugar cane dominated. This is upheld in Vogeler et al. (2011), who largely cite Britsch (1989), holding that Brigham Young sent the first eight Mormon missionaries to the Hawaiian Islands in 1850. This initial mission yielded a significant religious, economic, and infrastructural foothold for the Mormon Church, as is evident in Voegler et al. (2011):

They arrived on December 12 in Honolulu, and then split up, traveling in groups of two or three to the other islands. Their original mission to convert the mainly foreign-born (*haole*) population proved to be difficult. The missionaries were discouraged and discussed returning home, but they instead decided to stay, to learn the Hawaiian language, and to preach to the native Hawaiians...The number of Hawaiian converts quickly grew, and in 1853, they decided to buy land on Lāna'i to start a colony, where all the brethren could live and work.

The Lāna'i colony was not a success, for a wide variety of reasons, and in 1864, the mission decided to found a new gathering place. In 1864, two Latter-day Saints Mission presidents, Francis A. Hammond and George Nebecker, traveled to Hawai'i to purchase land for a new Mormon settlement. Land was fairly cheap at this time in Hawai'i as the end of the Civil War in the U.S. had led to a depression in the sugar market, leading to an eagerness to sell land by sugar planters... In 1865, Hammond purchased a six-thousand acre plantation called "Lā'ie" from Thomas T. Dougherty. By 1865, the Church had 6,000 acres,

probably all the land in Lā‘iemalo‘o and a portion of the land in Lā‘iewai (minus the 298.5 acres owned by the Kahuku Ranch and Kahuku Sugar Company).

On this land was 600 head of cattle, 500 sheep, 250 goats, 20 horses, a large frame house, five native houses, and five acres of cotton...The first order of business for the new owners was to establish a cash crop that would sustain the settlement. Although corn and cotton were grown for the first two years, it soon became evident that sugar would be the salvation of the growing community. A mill was purchased and set up in Lā‘ie in 1868...The problem of insufficient water in some years was solved in the early 1880s, when a flume was built to bring water down from the Ko‘olau Mountains. A new, more efficient mill was built in 1879...

By 1866, about two hundred Hawaiians, mostly members of the Church, were living at the Lā‘ie mission settlement...Growth of the community was slow through the 1870s, due to most Hawaiians wishing to stay near their own homes. In 1874, only about 377 members lived near the mission... However, church membership as a whole did increase during this time; in 1865, the island-wide membership of the Hawaiian mission was recorded as 500; by 1906, it was 7,212 strong... (Voegler et al. 2011:41-42).

In 1920, the Mormon Temple was erected in Lā‘ie, with a price tag of \$250,000, which was intended to resemble a tabernacle in Salt Lake (Elder 1922:194).

Transportation in Kahuku, Keana, and Mālaekahana Ahupua‘a

The entire northern portion of O‘ahu was greatly isolated from the Western urban sprawl of Honolulu until paved roadways and rail were implemented. While this area remained “country,” the new transportation infrastructure forever changed the landscape Kahuku, Keana, and Mālaekahana Ahupua‘a. According to Kuykendall (1953),

On Oahu, what came to be called the “round-the-island road” --ancestor of Kamehameha Highway--extended from Honolulu to Ewa, thence across the central plateau to Waialua; from that place it ran along the coast past Kahuku and Kualoa to Kaneohe, where it joined the road which came over the Nuuanu pali from Honolulu. In 1856, for the first time, a four-wheeled carriage drawn by a pair of horses was driven over the portion of this road between Honolulu and Kahuku. Three years later, a Captain Coffin is reported to have driven with a carriage and span of horses from Honolulu to Kahuku one day in ten hours and to have returned the following day in eight hours (Kuykendall 1953:25).

In the late 1800s, the O‘ahu Railway and Land Co. ran a line up to Kahuku from Honolulu via the Pali – with the terminus of the line running from Wai‘anae (Honolulu Star-Bulletin 1941:155). This line was lauded for opening up new economic opportunities to windward districts of O‘ahu (ibid.:158). Wong-Smith (1989) summarizes this as follows:

For its first nine years Kahuku Plantation Co. relied on little coastal vessels which anchored offshore from Kahuku Landing to bring supplies and return raw sugar to Honolulu. Five miles of 36-inch gauge railway, some of it portable, had been laid in 1890 to haul the cane through the plantation fields to the Kahuku mill and thence to the landing. The plantation track extended south opposite Laie and the Mormon settlement, which sent its cane to be ground at Kahuku... In 1899, the Oahu Railway finally laid track to a terminal at Kahuku. It hauled sugar and the

agricultural freight products back and forth across the windward part of Oahu. The Koolau Railway Co. laid tracks from Kahana to Kahuku and served as a common carrier until 1931. From then until the 1950s, its sole function was to carry cane from the northeastern field of the island (Wong-Smith 1989:A-15-16).

Military Presence in Kahuku, Keana, and Mālaekahana Ahupua‘a

Prior to the construction of any U.S. military bases in Hawai‘i, the American Marconi Company set up a wireless operation in Hawai‘i in 1902, building their transpacific receiving station at Kahuku in 1915. This site is located less than 3 kilometers north of the Nā Pua Makani Wind Project area.

According to O’Hare et al. (2008), Kahuku Golf Course, which is less than one kilometer east of the project area, also played a part in World War II, stating:

It was during the attack on Pearl Harbor on December 7, 1941 that the Kahuku Golf Course was first used as an emergency landing field. On December 6, twelve B-17s had left California on route to the Philippines, with a stopover for refueling at O‘ahu. They flew into O‘ahu completely unaware of the Japanese attack and had to quickly dodge strafing by the Japanese Zeros. Amazingly, they all managed to make emergency landings, seven at Hickam Air Field, one at Wheeler Airfield, one at Bellows Airfield, one at the tiny Hale‘iwa Airport, and one on the grass and sand surface of the Kahuku Golf Course...The Army Air Force on O‘ahu had planned to build an emergency strip at the golf course, but it had not been completed by the time of Pearl Harbor attack (O’Hare 2008:28).

In 1942, the Kahuku Airfield was constructed as an auxiliary airfield, with several runways, ancillary bunkers, and emplacements (O’Hare and Hammatt 2006:21). Pilots from Wheeler Air Force Base were trained to fly a variety of aircraft on this airfield. By the late 1940s, Kahuku Field was abandoned and the lands once leased by the military were returned to the landowner. This former airfield was located near the present day Turtle Bay Resort.

According to Nakamura (1981), the *wao/mauka* areas of Kahuku and Keana Ahupua‘a were also leased to the U. S. Military for training purposes in the mid-1950s. These lands, referred to as the Kahuku Training Area (KTA), have continuously been utilized by various branches of the United States Department of Defense and have not been easily accessible to the general public since. KTA makes up most of the western boundary of the Nā Pua Makani project area.

4.0 PREVIOUS ARCHAEOLOGICAL INVESTIGATIONS

A total of 39 archaeological studies have been conducted in various locations within a 2.5 kilometer radius around the proposed Nā Pua Makani Wind Project lands. Presented in the following section is a summary of the findings for these reports. A list of the reports and their locations in chronological order is provided in Table 4 and map of the project area with all of the study areas and known archaeological sites is provided in Figure 6.

The earliest systematic archaeological study performed in the vicinity of the Nā Pua Makani Wind Project is the 1930 island-wide survey conducted by Gilbert McAllister (1933). In *Archaeology of Oahu*, McAllister identifies several historic sites near the project area, including McAllister's Site 269 (traditional platform) and Site 270 (Keana Cave), located less than 300 meters north of the project area. In addition, Kaaulelemoa Fishpond (Site 268) is located less than a kilometer north of the project area, a traditional fishing shrine on Makahoa Point (Site 272) is less than a kilometer to the east, and Pōlou Pool (Site 271) is located just over a kilometer to the north.

Nearly 50 years later, a state-wide survey of petroglyph sites was performed by J. Halley Cox and Edward Stasack (1970). In this study, Cox and Stasack (1970:97) recorded a human figure petroglyph on a boulder at Kalaeuila Point, which is ca. 4 kilometers south of the Kahuku/Keana boundary.

In 1977, Paul Rosendahl performed an archaeological inventory survey on 1,044 acres (non-contiguous) of the 9,646-acre Kahuku Training Area (KTA), the eastern sections of which abut and overlap portions of the west-southwest boundaries of the current Nā Pua Makani Wind Project lands. During this reconnaissance undertaking, Rosendahl (1977) identified nine archaeological sites, including four previously recorded sites that were destroyed (-259, -260, -1043, and -9517), one previously recorded site that was intact and on the State of Hawai'i Register of Historic Places (-2501), and four newly discovered sites (-9506 through -9509). All sites found by Rosendahl (1977) are located in the *ahupua'a* of Hanakaoe and nearly 2 kilometers to the northwest of the project area. Only site -9506, Kea'aulu Ditch, which is described as a historic stone-faced irrigation ditch, is located in close proximity to the project area (ca. 500 meters southwest).

In 1978, the Kualoa Archaeological Research Project (City and County of Honolulu) was tasked with a reconnaissance survey of the 49.9-acre Ko'olauloa Housing Project area and the 7.4-acre Kahuku District Park Expansion area (Clark 1979). These areas are located less than 500 meters north of the project area. During the survey, local informants led the archaeologists to a locale in the housing area that they referred to as a "sacred way," which was a cleared area with no visible man-made features, but held some spiritual significance to the community. Site -269 was relocated in the school expansion area and described as a stone platform containing a large coral slab that was interpreted as a possible *kū'ula* or god stone. Also revisited was Keana Cave (Site -270) where human skeletal remains were observed on the slope of the cave entrance. In

Table 2. Previous Archaeological Investigations in the Nā Pua Makani Wind Project Vicinity

Authors	Year	Report Title	Project Location	Findings
McAllister	1933	<i>Archaeology of Oahu.</i>	Island-wide survey.	Sites 50-80-02-0268 through -0272 near Nā Pua Makani Wind Project area.
Cox and Stasack	1970	Hawaiian Petroglyphs.	Island-wide survey.	Located a petroglyph on a beach boulder in either Keana or Kahuku Ahupua'a.
Rosendahl	1977	Archaeological Inventory and Evaluation Report for U.S. Army Support Command, Hawai'i (USASCH). Parts I Report Text and II Tables.	Kahuku Training Area, selected portions totaling 1,044 acres.	Relocation of three sites and discovery of six new sites (No. 50-80-02-9506 through -9509); Site -9506 (Historic stone faced irrigation ditch) is less than 0.5 km southwest of project area.
Barerra	1979	Kahuku Archaeological Survey.	Described in Barrera (1981) as located "...inland of the post office at Kahuku."	Discovery of five sites (No. 50-80-02-1425 through -1429), largely traditional.
Clark	1979	Preliminary Archaeological Reconnaissance Report for Ko'olau Loa Housing Project and Park Expansion, Kahuku, Island of O'ahu. Kualoa Archaeological Research Project.	57.3-acres in the proposed Ko'olau Loa Housing Project area and Park Expansion Area, Kahuku.	Relocation of Site -0269, A "sacred way," (described as a Hawaiian sacred area having no structural features).
Schilt	1979	Archaeological Reconnaissance Survey of Proposed Extension, Kahuku Elementary School, Kahuku, O'ahu.	4-acres in the Proposed Extension of Kahuku Elementary School.	Relocated a rock shelter and platform previously recorded by McAllister (1933). Two new sites (a mound and overhang shelter) were also found.
Yent and Estioko-Griffin	1980	Archaeological Investigations at Mālaekahana (50-80-02-2801), Windward O'ahu.	Mālaekahana State Park, Phase I (south portion).	Site No. -2801; 3-year project; performed mapping, testing, excavation, and analysis; 3 major occupational layers found (ca. AD 1600-1780).
Barrera	1981	Cultural Resources Reconnaissance of the Kahuku Agricultural Park Project Area.	Four separate parcels totaling 3,000 acres in <i>mauka</i> Kahuku, Keana, and Mālaekahana Ahupua'a.	Three new sites: (1) a surface scatter of historic and traditional artifacts, (2) a single cowrie shell, and (3) a surface scatter of Historic artifacts. Sites 2 and 3 are located near a prominent limestone outcrop.
Davis	1981	Archaeological Reconnaissance Survey of Hawaiian Wind Farm Project area at Kahuku O'ahu, Hawai'i.	Kahuku Training Area, selected portions (proposed windmill sites).	Discovery of four additional sites, including a Historic stone wall remnant, a habitation complex, agricultural terraces, and stone platform.
Sinoto	1981	Archaeological Reconnaissance Survey of Ki'i and Punamanō Wetland Refuge Units, Kahuku, O'ahu, TMK 5-6-02 & 3.	Ki'i and Punamanō Wetland Refuge Units in Kahuku.	Relocation of two sites found by McAllister (1933): Punamanō Spring and Ki'i Fishpond.
Yent & Ota	1982	Mālaekahana Phase II Initial Testing Results.	Mālaekahana State Park, Phase II (central portion).	22 cores; cultural materials encountered only in coastal cores; no new sites found.
Rogers-Jourdane	1982	Archaeological Reconnaissance Survey of Marine Culture Enterprises Lands in Kahuku, O'ahu Island.	45 acres in Kahuku Golf Course area.	No sites found.

Authors	Year	Report Title	Project Location	Findings
Yent & Ota	1983	Eroding Archaeological Site at Mālaekahana Phase III, Mālaekahana Bay, Windward O'ahu.	Mālaekahana State Park; Dune area of Phase III.	In eroding dune face, a human burial, imu, and two hearths were recorded (Site No. -1038).
Yent & Estioko-Griffin	1986	Results of Auger Coring Conducted at Mālaekahana State Recreation Area, Phase II, Ko'olau Loa, O'ahu.	Mālaekahana State Park, Phase II (northern portion).	11 cores excavated; no sites found.
Sinoto	1986	Perimeter Flagging for Proposed Fencing Around Two Archaeological Site Areas, Kahuku Elementary School, Kahuku, O'ahu. Letter Report.	Kahuku Elementary School, Keana Ahupua'a.	No new sites found; flagging of McAllister (1933) Sites -0269 and -0270.
Jensen	1989 a & b	Archaeological Inventory Survey Punamanō and Mālaekahana Golf Courses Lands of Ulupehupehu. Punalu'u. Kahuku, Mālaekahana, and Lā'ie, Ko'olau Loa District, Island of O'ahu.	Non-contiguous project area, totaling 866-acres of inland Kahuku. Punamanō Golf Courses is within Ulupehupehu, Punalau and Kahuku Ahupua'a. Mālaekahana Golf Course is in Lā'ie and Mālaekahana Ahupua'a.	Twenty-six sites containing 45 component features were identified. Traditional site types: caves, overhangs, walls, terraces, platforms, enclosures, isolated midden deposits. Historic site types: WWII II emplacements, dumps, roads, and agricultural ditches.
Kennedy	1989a	Archaeological Inventory Survey for the Proposed Mālaekahana Golf Course, A Portion of the Country Courses at Kahuku.	200 acres inland of Mālaekahana Bay and Kalanai Point, ca. 100 meters southeast of project area. Was location of Site -0275, Wai'āpuka, a legendary sinkhole with spring.	Thirteen new sites found (11 Traditional habitation and agricultural sites and 2 Historic Plantation and Military sites). Also, 6 sand dunes recommended for testing. Letter report lists only temporary site numbers. Site -0275 not relocated.
Kennedy	1989b	Archaeological Assessment and Reevaluation Report Concerning the Recently surveyed, Proposed Punamanō Golf Course; A Portion of the Country Courses at Kahuku.	Inland Ulupehupehu, Punalau and Kahuku Ahupua'a.	Two new Historic sites to the Jensen's (1989 a&b) findings with a total of 14 additional features. Also recommends preservation of Site -4070 (possible burial).
Kennedy	1989c	Archaeological Reconnaissance Survey at TMK: 5-6-02:25, Located at Kahuku, O'ahu.	Across Kamehameha Hwy. to the north of Hospital (Kahuku Medical Center).	No sites found.
Kennedy	1990	Kahuku Sand Mining Project: Archaeological Subsurface Testing Results.	Immediately southwest of Kahuku Golf Course.	No burials or cultural layers were found during testing.
Pfeffer & Hammatt	1992	Waialua to Kahuku Power Line.	Uplands of Ahupua'a spanning from Waialua to Kahuku.	
Hammatt & Pfeffer	1992	Archaeological Reconnaissance of Kahuku Agricultural Park.	Upland Keana Ahupua'a.	One day reconnaissance survey yielded no new sites.
Dagher	1993	Inadvertent Discovery of a Human Burial At Makahoa Point, Mālaekahana, Ko'olau Loa, O'ahu.	Makahoa Point.	A single pre-Contact era human burial of Hawaiian ancestry was inadvertently discovered.
Jourdane	1994	Inadvertent Discovery of Human Remains near Kahuku Golf Course, Kahuku, O'ahu.	Near Kahuku Golf Course.	A single pre-Contact era juvenile human burial was inadvertently discovered.
Hammatt	1996	Archaeological Reconnaissance for Proposed Mālaekahana Exploratory Wells, Mālaekahana, O'ahu.	Just mauka of the southern mauka end of the NPM APE.	Archival research and archaeological background performed. No sites recorded.

Authors	Year	Report Title	Project Location	Findings
Hibbard	1997	Inadvertent Discovery of Human Remains, Japanese Cemetery, Kahuku Golf Course, TMK 5-6-002:010. Memo in Burial Files.	Japanese Cemetery near Kahuku Golf Course.	A single pre-Contact era human bone was inadvertently discovered.
Collins	1999	Recovery of Human Remains From Kahuku Golf Course.	Kahuku Golf Course (makai).	Pre-Contact era human remains were inadvertently discovered (site -5773).
Perzinski & Hammatt	2001	Archaeological Inventory Survey Report for Hospital Ditch and Ki'i Bridge in the Ahupua'a of Kahuku, District of Ko'olau Loa, Island of O'ahu (TMK: 5-6-02, 05 & 06).	Kamehameha Hwy., Kahuku near detour roads.	No sites recorded.
Calis & Tome	2002	An Archaeological Monitoring Report for the Force Main Sewer Replacement Project, Kahuku Ahupua'a, Ko'olauloa District, O'ahu Island, Hawai'i.	Force Main Sewer, makai of Kamehameha Hwy., Kahuku.	No sites recorded.
Stride et al.	2003	Archaeological Inventory Survey of the Proposed 785-Acre Kahuku Agricultural Park.	The original 1993 project area was 1666 acres, later in 2003 reduced to 785 acres in upland Kahuku and Keana Ahupua'a (single report submitted in 2003).	In all, 21 sites were located in original project area. However, 7 sites were recorded (50-80-02-4510 through -4516) in the revised area. Site types: wall sections, overhang shelters, terraces, and enclosures. Most appear to function as habitation sites from pre-contact into Historic times.
O'Hare et al.	2004	Documentation of the Kahuku Sugar Mill, Kahuku Ahupua'a, Ko'olau Loa District, Island of O'ahu.	Kahuku Mill Complex.	Documentation report of remaining Plantation structures.
O'Hare et al.	2008	Archaeological Inventory Survey Plan for the Kahuku Subdivision Project, Kahuku, Keana, and Mālaekahana Ahupua'a, Ko'olau Loa District, O'ahu Island TMK: (1) 5-6-002; 003, 010, 012, 016, and 027.	200 acres of makai Kahuku, Keana, & Mālaekahana Ahupua'a. Bound by the coast, Makahoa Point, Kaluahole, & Kamehameha Hwy.	No sites recorded. Extensive background research performed on area.
Morrison	2009	Archaeological Background Report for the Proposed Nā Pua Makani Wind Farm Project, Kahuku, O'ahu (TMK 5-6-008:006).	231.9 acres of Kahuku and Keana Ahupua'a, mauka of Kahuku Hospital.	No sites recorded. Background research performed on area.
Rechtman	2009	A Comprehensive Archaeological Survey of the First Wind Kahuku Wind Power Project Area (TMKs: 1-5-6-05:007 & 014).	230 acres west of Kahuku Village and 2.5 kilometers inland of coast.	SIHP Site 4707, which was described as sugarcane field infrastructure.
Dagher & Spear	2010	Literature Search and Field Inspection of the Kahuku Storm Damage Reduction Project Kahuku Ahupua'a, Ko'olau Loa District, O'ahu Island.	Kahuku Intermediate and High School grounds & park adjacent to the west.	No sites recorded. Background research performed on area.
Dagher & Spear	2014a	Archaeological Inventory Survey Report for the Kahuku Village Subdivision Project, Keana and Mālaekahana Ahupua'a, Ko'olau Loa District, Island of O'ahu, Hawai'i [TMK (1) 5-6-002:027].	Portion of 50 acres between Kahuku Golf Course and Kamehameha Hwy.	A single site was found (site No. -7508), consisting of ten features (9 plantation era & 1 pre-Contact to early Contact era).

Authors	Year	Report Title	Project Location	Findings
Dagher & Spear	2014b	An Archaeological Monitoring Report for the Kahuku Village Subdivision Project, Keana and Mālaekahana Ahupua‘a, Ko‘olau Loa District, Island of O‘ahu, Hawai‘i [TMK (1) 5-6-002:013, 014].	Portion of 50 acres between Kahuku Golf Course and Kamehameha Hwy.	Five archaeological sites found: site Nos. -7398 (historic cesspools); -7399 (Burial); -7400 (-7401 and -7511); -7398.
Lyman & Spear	2014	Archaeological Inventory Survey for the Kahuku Village Subdivision Project Keana Ahupua‘a, Ko‘olau Loa District, Island of O‘ahu, Hawai‘i [TMK: (1) 5-6-002:047 por].	Kahuku Village immediately makai of Kamehameha Hwy. and mauka of Kahuku Golf Course.	Site No. -7508, feature 8 (Historic existing Plantation era homes) relocated.

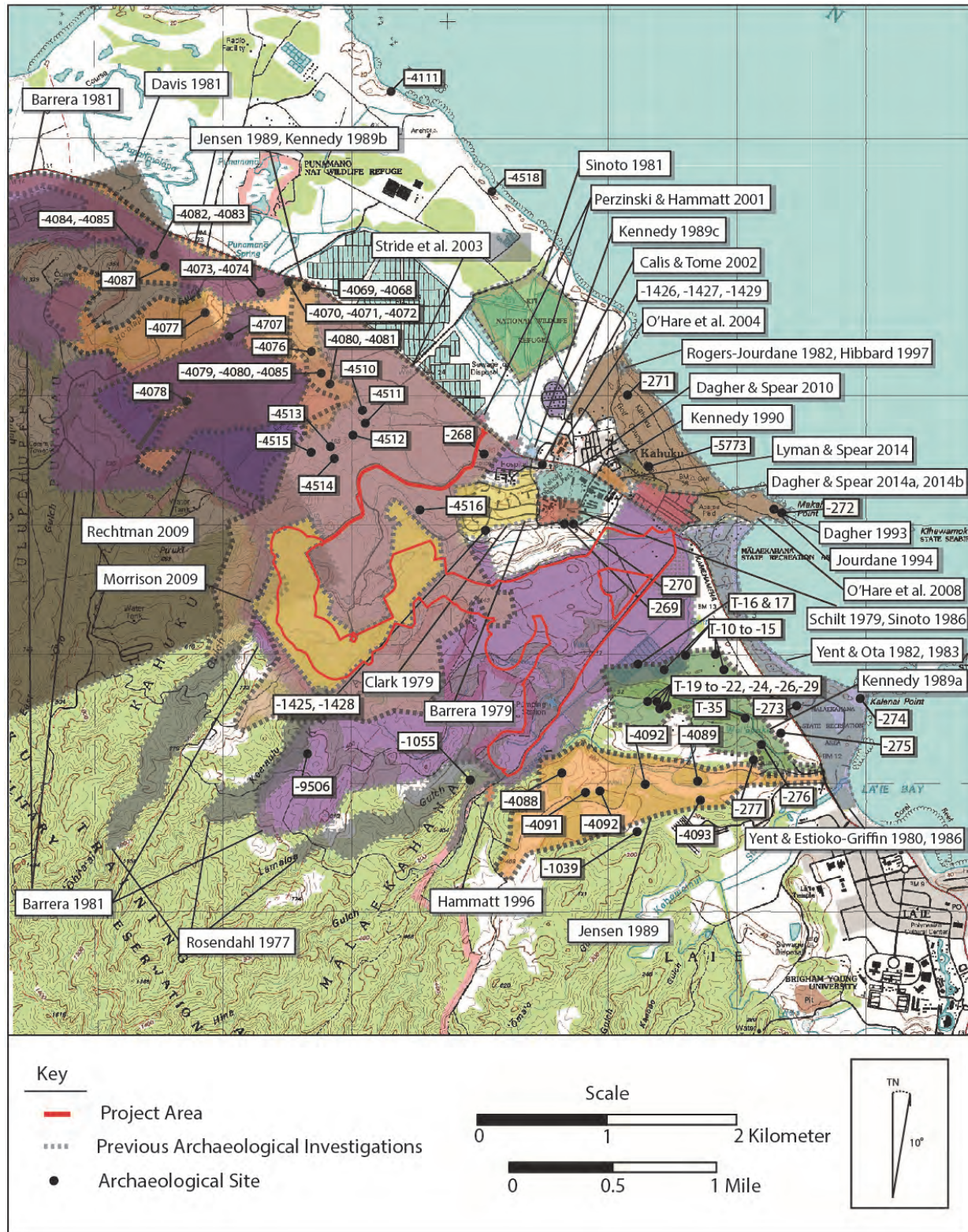


Figure 6. Previous archaeological studies and sites in vicinity of NPM project area (adapted from USGS Kahuku Quadrangle Map).

addition, Clark (1979) found a second rock shelter located along a coral outcrop that contained skeletal remains, possibly human, and wood. Clark (1979) noted several other small crevices in outcrops and rock shelters with crude walls in the project area, but did not investigate further. A single historic grave with a marker exhibiting a date of 1945 was also found during this investigation.

William Barrera (1979) revisited the Ko'olau Loa Housing project the following year, conducting a more thorough archaeological inventory survey and subsurface testing. Barrera (1979) suggested that two limestone knolls and the base of a limestone ledge had the potential to contain archaeological sites, and that the rest of the area had been impacted by sugarcane activities. These three areas were surveyed, yielding five archaeological sites. Site No. -1425 was comprised of two walls aligned at the base of the limestone cliff. Site No. -1426 was described as a rock-lined depression and a metal pipe located at the eastern knoll. Site No. -1427 consisted of a complex of three walls, three rock mounds, and one cave located on the eastern knoll. Site No. -1428 was described as a wall situated on top of a cliff. Site No. -1429 consisted of an earthen mound within an L-shaped wall. Although several of the features were tested, no cultural remains were observed. The conclusion was that most of these features, if not all, were historic and associated with sugar cane cultivation (Barrera 1979).

In 1979, a crew from the Bishop Museum recorded Sites No. -269 and -270 (Schilt 1979), during an archaeological reconnaissance survey for the 4-acre Kahuku School Expansion project. Although some collapse and disturbance was observed on the platform (Site No. -269), Schilt (1979) noted that one component of the platform was a large coral "block," which may indicate that the feature had a ceremonial component. Sketches were made of the platform as well as photographs to record the condition of the platform. Schilt (1979) also noted that the two stones at the entrance of Keana Cave (Site No. -270) were natural formations and that the cave floor was covered by scattered limestone fragments that were likely roof fall, but that midden could possibly lie below it. A roughly rectangular stone mound (Site No. -2478) and a small overhang located within a large outcrop (Site No. -2479) were also recorded (Schilt 1979).

A reconnaissance survey was performed in 1981 by Barrera for the 2,500-acre Kahuku Agricultural Park, which was separated into four parcels. This study area nearly encompasses the current Nā Pua Makani Wind Project area. Barrera (1981) brief survey was performed in three of these parcels and a more thorough survey was performed in one 500-acre parcel. The current project area lies largely in the 500-acre parcel intensively surveyed and the eastern most parcel Barrera (1981) surveyed. In his background research, Barrera (1981:19) listed sites on file at the SHPD office at that time, stating that Site -1055, described as a "Shelter Cave," was outside of his project area and mapped it approximately 200 meters west of the southernmost projection of the project area. However, no source was cited in Barrera's 1981 report. Three archaeological "locations" were identified in the westernmost parcels, which did not include any structural features, but consisted of solely of possibly pre-Contact and historic surficial remains. These three locations were all within Kahuku Ahupua'a, just under a kilometer north of the project area. Location 1 consisted of a marine shell, coral fragments, and basalt flakes. Location 2 was comprised of one cowry shell. Location 3 was a concentration of glass bottle fragments.

Subsequently, Bertel Davis (1981) performed a reconnaissance-level survey in selected areas of KTA for a proposed wind farm, which yielded four newly identified sites (Site No -2357 through -2360). Site No. -2357 consisted of a discontinuous segment of a stacked stone wall that supported a barbed-wire fence with milled wood posts. Sites No. -2358 through -2360, consisting of a house site, habitation terraces, and a terrace with ceremonial features (respectively), are suggested to be functionally and spatially related, being situated within a swale in upland 'Ōpana Ahupua'a (Davis 1981). These findings are located over 3 kilometers to the northeast of the project area.

The same year, Aki Sinoto of the Bishop Museum performed a brief reconnaissance survey of the Ki'i and Punamanō Wetland Refuge areas (Sinoto 1981), finding that the land had been extensively modified. He noted a single historic site, which was an old OR&L railroad track. The entire wetland site was designated 50-0a-F4-10/11. While Sinoto (1981) referred to this area as Kahuku Fishpond, one of McAllister's (1933:154) informants maintains that this area was always a swamp - not a fishpond.

Between the years 1980 and 1986, several archaeological investigations were performed in Mālaekahana State park, which had been divided into three phases. In 1980, Yent and Estioko-Griffin performed mapping, testing, excavation, and analysis at Site No. 50-80-02-2801, which was in Phase I located in the southern portion of the park. The three-year project yielded three major occupational layers dating from ca. AD 1600 to 1780. (Yent and Estioko-Griffin 1980:xxi-xxiv). Yent and Ota (1982) performed auger testing at Phase II of the park, which is the northern portion of the park. Of the 22 cores, cultural materials were encountered only in coastal areas. No new sites were found. The next year, Yent and Ota (1983) recorded a human burial, *imu*, and two hearths in an eroding dune face in Phase III, which is in the center of the bay's coast (Site No. 50-80-02-1038). In 1986, Yent and Estioko-Griffin excavated 11 cores in the southern extent of Phase I, which yielded no new sites (Yent and Estioko-Griffin 1986).

Also in 1982, Rogers-Jourdane performed a reconnaissance survey of approximately 45 acres of the Kahuku Golf Course as well as a 2,000-foot long by 100-foot wide corridor for an associated pipeline. This survey yielded no archaeological sites (Rogers-Jourdane 1982). This project area was located over 200 meters to the northeast of the current project area.

Four years later, Sinoto revisited Sites No. -269 and -270 to flag the perimeter for protective fencing to be installed prevent damage during the proposed Kahuku Elementary School extension construction activities (Sinoto 1986).

In 1989, Jensen performed an archaeological inventory survey of two separate areas for the proposed development of Punamanō and Mālaekahana Golf Courses project, totaling 866 acres. Twenty-six sites containing 45 component features were identified between the two separate project areas. These reports were initially released as a single report by Jensen (1989a). Later that year, they were released as separate reports with a change in project area for the Mālaekahana Golf Course and, thus, new survey area, released by Kennedy (1989b). A reevaluation of Jensen's (1989) Punamanō Golf Course survey was also released by Kennedy (1989a). The proposed 638-acre Punamanō Golf Course was located less than one kilometer north of the current project area. Twenty-six archaeological sites were recorded by Jensen (1989)

in this portion of the project area (Sites No. -4076 through -4081, and -4085). Site No. -4076 is comprised of an overhang shelter complex of eight features (Features A-H) with visible midden and basalt flakes. Site No. -4077, also a complex (Features A-C), was described as a terrace with a wall and *'auwai* (modified crevasse). Site No. -4078 is a three feature complex (A-C) comprised of an overhang shelter with two stacked walls. Site No. -4079 consists of short wall segments. Site No. -4080 is described as a Historic trash dump and bottle scatter. Site No. -4085 is a complex of two features (A and B), Feature A being an enclosure and Feature B being a low wall. Kennedy (1989b) reviewed and reevaluated Jensen's (1989) findings and added two new Historic sites, including an enclosure complex and an irrigation ditch, as well as fourteen new features associated with sites previously identified by Jensen (1989). SIHP numbers for newly identified sites were not provided. Further, Kennedy (1989b) suggested that Jensen's (1989) Site No. -4076 be preserved, as Kennedy maintained that it could possibly be a burial. Kennedy's (1989a) survey of 200 acres at the site of the proposed Mālaekahana Golf course, which was not the same survey area as Jensen's (1989) Mālaekahana Golf Course project area, yielded 19 surface features. These sites included overhang shelters with evidence of previous human occupation, suspected agricultural terraces, low mounds, midden scatter areas, large, sandy dune formations with suspected cultural components, prehistoric surface artifacts, a historic gun emplacement, and a historic railroad bed. Kennedy (1989a) found thirteen new sites, consisting of 11 traditional habitation and agricultural sites and two Historic Plantation and Military sites. Also, six sand dunes recommended for testing. Sites in this report did not receive SIHP numbers, but were designated temporary site numbers. This portion of the project area is located less than 100 meters south of the current Nā Pua Makani Wind Project's southern boundary.

Later that year, Kennedy (1989c) performed a reconnaissance survey on a 14-acre parcel across Kamehameha Highway of Kahuku Hospital, which is roughly 1 kilometer north of the project area. While no archaeological sites were identified, Kennedy noted that Ki'i Ditch ran through the parcel. There is no evidence that this plantation-era ditch followed an earlier *'auwai*, or traditional irrigation ditch.

In 1990, Kennedy performed archaeological subsurface testing in a parcel just northeast of the Kahuku Sugar Mill and approximately 500-meters north of the current project area. Although no archaeological materials were found in the 47 trenches, a single early modern trash pit and a few shallow irrigation channels associated with nearby small garden areas were observed. The stratigraphy of the trenches suggested that a sand deposit, which has been formed by gradual Aeolian processes over a lengthy time period, exists throughout the area. As such, human remains may potentially exist in the upper, penetrable sand deposit (Kennedy 1990).

Pfeffer and Hammatt (1992) of Cultural Surveys Hawai'i, performed an archaeological assessment of an area spanning from Waialua to Kahuku for a power line project. They noted that a multitude of archaeological sites may be present in the vicinity of the project area, with greater probability in coastal areas.

A one-day survey was performed by Hammatt and Pfeffer in 1992 on four parcels (1A, 1B, 2, and 3) in *mauka* Keana Ahupua'a for the Kahuku Agricultural Park, limiting the survey to areas not under cultivation. No sites were recorded during the brief survey.

In 1992, Cultural Survey Hawai'i (CSH) surveyed ca. 785 acres that included the western portion [TMK (1) 5-6-008:006] of the current project area (Figure 7; Stride et al. 2003). The original survey area was 1,600 acres, but then reduced to ca. 785 acres with no reason given. Figure 7 shows that most of the western portion of the current project area was surveyed by CSH. Approximately 53 acres of this western portion of the current project area was not previously surveyed. In addition, CSH was originally supposed to survey an additional ca. 900 acres to the east [TMK (1) 5-6-006:018] which would have included nearly all of the current Nā Pua Makani project area. However, CSH never completed the survey to the east or explained why the project area was reduced.

Stride et al. (2003) state that 21 sites were identified in the overall 1,600 acre survey area, but only seven sites were located in the reduced ca. 785-acre western portion. This indicates 14 sites were found in the eastern portion of the original CSH survey area, which includes the current Nā Pua Makani project area. These sites were not described, so it not known what types of sites were found or where they were located.

Stride et al. (2003) describe the seven sites which they recorded near the western side of the current project area. These seven sites are located to the north and outside of the current project area. These seven sites are composed of 16 features: overhang shelters (n=8) (one of which contained human remains), walls (n=3), terraces (n=3) an enclosure (n=1), and a U-shaped temporary shelter (n=1) and terraces.

The results of the CSH survey indicate that although the current project area and vicinity was severely impacted by large-scale commercial agriculture, the area still has the potential to contain significant cultural resources. These resources would be in areas not impacted by mechanized agricultural activities. There is also the possibility that subsurface deposits may be present, but this is somewhat unlikely.

In 1993, a single pre-Contact era human burial of Hawaiian ancestry was inadvertently discovered at Makahoa Point (Dagher 1993), which is approximately 800 meters east of the current project area. The following year, Jourdane (1994) wrote a letter report for a single pre-Contact era juvenile human burial that was inadvertently discovered near the Kahuku Golf Course, ca. 800 meters east of the project area. In 1997, a single human bone, assumed to be pre-Contact era, was inadvertently discovered near the Kahuku Golf Course, approximately one kilometer north of the current project area (Hibbard 1997). Several years later, another set of pre-Contact era human remains were inadvertently discovered at the golf course (Site -5773), less than 500 meters north of the project area (Collins 1999).

An archaeological inventory survey was performed in 2001 for the Hospital Ditch and Ki'i Bridge/Drainage (Perzinski and Hammatt 2001), which is located just over 1 kilometer north of the project area. No archaeological sites were noted.

Archaeological monitoring was performed in 2002 during excavations related to the 670-meter long force main sewer replacement *makai* of Kamehameha Hwy, which is a little over one kilometer north of the current project area (Calis and Tome 2002). Although no archaeological sites were encountered during ground disturbing activities, Calis and Tome (2002) recorded the

stratigraphy of this area that appeared to be largely imported construction fills related to sugar cane cultivation and irrigation.

In 2004, O'Hare et al. conducted documentary research for the Kahuku Sugar Mill complex, following Historic American Engineering Records (HAER) recording format (O'Hare et al. 2004). The mill is roughly 900 meters north of the current project area.

O'Hare et al. (2008) performed extensive background research for the Kahuku Subdivision Project area, which is comprised of 200 acres that are located less than 300 meters northeast of the current project area. No sites recorded.

In 2009, International Archaeological Research Institute, Inc. (IARII) conducted archival research on the western portion of the Nā Pua Makani project area [TMK (1) 5-6-008:006] for West Wind Works, LLC (Morrison 2009). IARII reviewed early historic documents, historic maps, and previous archaeological investigations in the area.

IARII's research indicated that at the time of first European contact (1779) the general Kahuku area was densely settled and intensively cultivated. However, drastic population decline and reduction in agricultural practices were evident within 20 years (1794). In the mid 1800s, cattle and sheep ranching were being practiced in Kahuku, which led to dramatic vegetation change in the area. Sugar and pineapple cultivation began in the late 1800s resulting in extensive land modifications of the area. Figure 8, which shows that extent of historic commercial sugar cane and pineapple cultivation, is the result of IARII's research and the finding of a 1913 USGS map that shows the extent of these historic agricultural practices. Clearly, the majority of the Nā Pua Makani project area was extensively modified by these commercial agricultural activities.

IARII also reviewed the work done by CSH (Stride et al. 2003) and concluded that most of the Nā Pua Makani project area, as then defined (the western portion of the current project area [TMK (1) 5-6-008:006]), was surveyed by CSH. IARII noted that most of the area had been modified by historic agricultural activities and no archaeological sites were found.

IARII concluded that it is unlikely that any cultural remains would be found within the project area and that no further archaeological work was needed.

Rechtman (2009) conducted an archaeological inventory survey of the 230-acre First Wind Kahuku Wind Power project area located less than 300 meters northwest of the Nā Pua Makani Wind Project. A single archaeological site was recorded within the project area (Site -4707), which is an existing site recorded by Kennedy (1989) with related plantation infrastructure features that is located just outside of the project area.

Another background research report was prepared in 2010 by Dagher and Spear for the Kahuku Storm Damage Reduction Project, which is located approximately 500 meters north of the project area (Dagher and Spear 2010). No archaeological sites were recorded.

In 2014, Dagher and Spear performed an inventory survey on 50 acres between the Kahuku Golf Course and Kamehameha Highway for the Kahuku Village Subdivision Project, which is

directly across Kamehameha Highway of the current project area (Dagher and Spear 2014a). During this survey, a single site was found (Site -7508), consisting of ten features (nine plantation era and one pre-Contact to early-Contact era). Subsequently, Dagher and Spear conducted archaeological monitoring for the same project, where five additional archaeological sites were found, including Site -7398 through -7401, and -7511. Site types include human burials and historic cesspools (Dagher and Spear 2014b). Later the same year, Lyman and Spear (2014) conducted an inventory survey for the same project, but the area immediately northwest of Dagher and Spear's (2014a and 2014b) project area. No new archaeological sites were found.



Figure 7. Map showing areas archaeologically surveyed and not surveyed in the CSH study in relation to current APE.

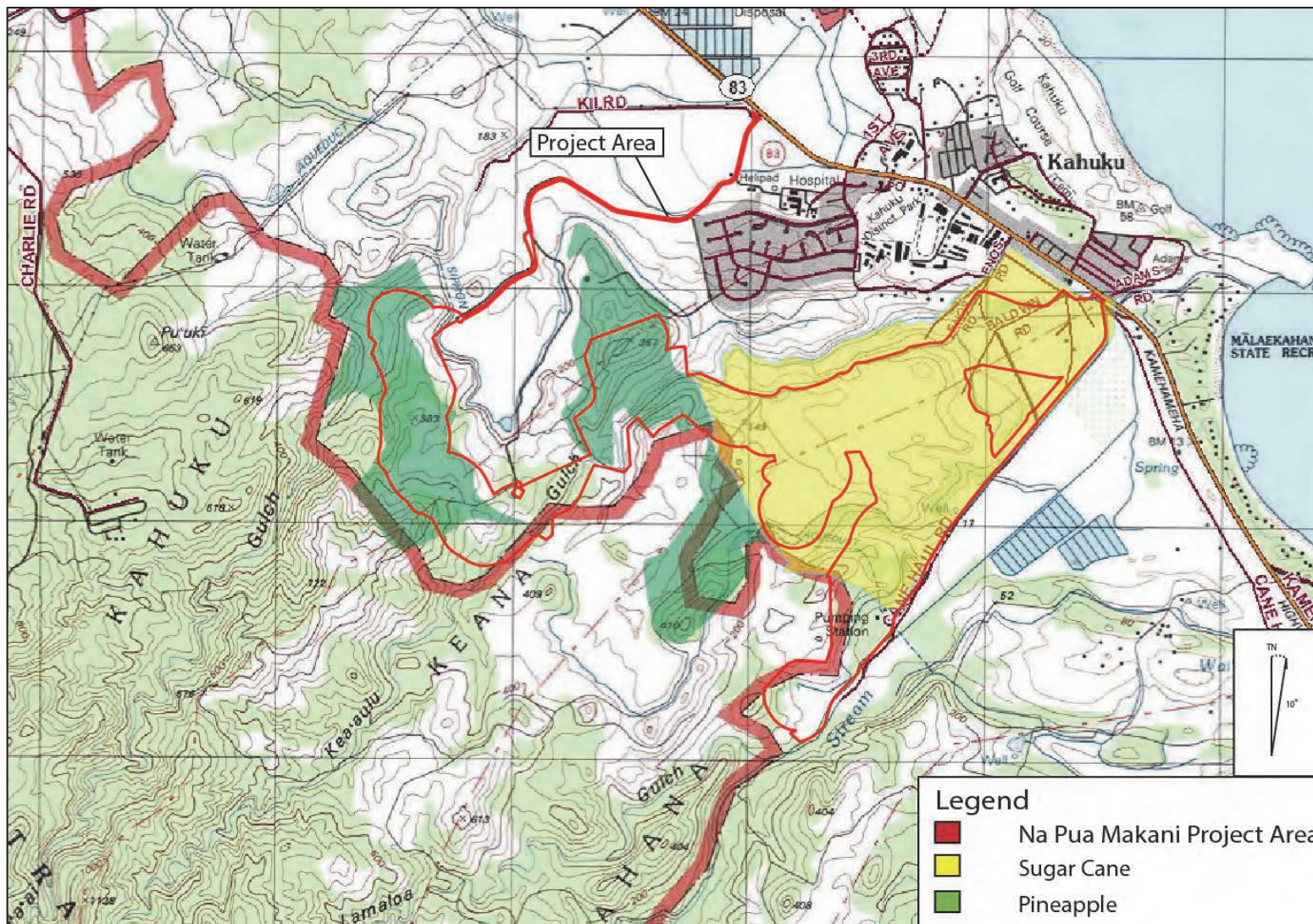


Figure 8. Location of former commercial agricultural lands (map source: National Geographic TOPO; data from Morrison 2009:Figures 4, 7, and 8).

5.0 METHODS

Under the overall direction of Paul L. Cleghorn, Ph.D., Pacific Legacy archaeologists, James McIntosh, B.A., Caleb Fechner, B.A., Jeff Putzi, B.A., Kimberly Mooney, B.A., Amara Kunishi, B.A., and Gina Farley, M.A. conducted multiple sessions of field investigations over an eight month period between April and December 2014.

The original APE began as approximately 450 acres but was subsequently altered to the current 464 acres due to changes in development plans. As a result, several sites (n=17) that were originally recorded during the survey are now outside of the APE and thus will not be affected by the project. However, Pacific Legacy is reporting the results of these sites here because they were formally documented prior to the change of APE.

5.1 PEDESTRIAN SURVEY

The team began the survey in April on the far western side of the project area on the lands owned by the State of Hawai'i. Team members were spaced between 10 to 20 meters apart depending on vegetation density and ground visibility. As close as possible to a 100% coverage survey was achieved. The team surveyed ridge tops, slopes and valleys throughout the APE. Slopes greater than 35 to 40 percent were not surveyed due to the low likelihood of containing cultural resources and safety issues. All drainages within the APE were surveyed. Special attention was paid to the sides and bases of the drainages where traditional Hawaiian features were predicted to be present.

When an archaeological feature was encountered, it was examined to determine whether it constituted an isolated element deserving its own site number or whether it formed part of a larger site complex. Each recognized archaeological site was then assigned a temporary field number to facilitate identification. This consisted of a T (for temporary) followed by a consecutively number (i.e., T-001). Individual structural features within a specific site were assigned consecutive letter designations to aid in recording and mapping.

Once identified, each site and its component features were fully documented. Vegetation clearance was undertaken as needed. The relative location of each site was mapped using a hand held Trimble GeoExplorer XT global positioning system (GPS) unit. Its coordinates were recorded in Universal Transverse Mercator, North American Datum of 1983, Zone 4 (UTM NAD 83 Z4) projection. An individual point was taken for each site (site datum) and most individual features (feature datum). In a few cases, dense vegetation and topography resulted in a lack of satellite signal and GPS coordinates were not recorded.

Detailed site and feature descriptions were recorded for all identified archaeological remains (Appendix B provides full descriptions for all recorded sites and features). Documentation also included digital photographs of each site. Plan view maps were prepared of the more complex sites using either a plane table or tape and compass. A metal site tag was filled out and left at

each site for relocation purposes. Since, at the time of the survey, SIHP numbers had not been assigned, the metal site tags left at each site were marked with the temporary field number and date.

5.2 TEST EXCAVATION

Subsurface backhoe testing was conducted at various locations throughout the project area. The focus of the testing was the areas where heavy ground disturbance would take place during the proposed construction of the wind farm. No subsurface testing was conducted within the active farm lots on the MHW lands to the east, however, one test trench was placed within one active farm lot along the roadway within the DOA controlled lands on the west side of the APE. An archaeologist stood-by and directed all backhoe excavations. Excavations were closely monitored, to ensure that no potentially significant finds were overlooked. Backhoe trenches ranged from 3 to 6 meters long and proceeded to 0.6 to 1.5 m below surface (2 – 4.9 feet). Once excavation of the trench was completed, a representative wall facing was cleaned and the stratigraphic profile was drawn and described; standard USDA descriptive terminology and Munsell Color references were used.

Two controlled, hand-excavated test units were excavated at two sites. They were excavated with trowel and dustpan and all soil was screened through nested 1/4 and 1/8 inch screens. Excavation preceded in arbitrary 10 cm levels within natural stratigraphic layers. Any cultural material identified was collected, bagged by provenience and transported back to the Pacific Legacy laboratory. The excavations were documented with notes on standard excavation forms. Profiles were drawn and the excavation recorded with digital images. Radiocarbon samples were submitted for identification and radiocarbon dating.

5.3 LABORATORY ANALYSES

All materials collected during the course of test excavations were transported to Pacific Legacy's O'ahu laboratory for processing, identification, and detailed analysis. Analysis of recovered materials included sorting, identification, labeling, and curation. 100% of faunal material (shell fish, marine bone, avian bone, mammal bone) was sorted as to recognizable taxa, weighed and analyzed. All shell and bone midden material was identified and sorted by family, genus, or species when possible and was weighed separately before being entered onto a site midden table. The few artifacts recovered during test excavation were cleaned, identified, measured, weighed, described, photographed, cataloged and analyzed for function and chronological patterns.

During the course of excavation, samples for radiocarbon dating were recovered from secure proveniences. Two charcoal samples were selected for radiocarbon analyses from Site T-072. Prior to submission for radiometric analyses, the charcoal samples were submitted to the Wood Identification Laboratory at the International Archaeological Research Institute, Inc. for species identification. Each sample was examined and identified by academically trained wood analyst Gail Murakami. The purpose of this analysis was to determine the presence or absence of

historically introduced wood and to differentiate between short lived and long lived species (short lived species are better indicators of the true date at which a piece of wood was burned). The results of wood analyses are presented in Appendix D. The two charcoal samples were then sent to Beta Analytic Radiocarbon Dating Laboratory for dating. Both samples were relatively small so that accelerator mass spectrometry (AMS) radiocarbon dating was necessary.

5.4 CURATION

All field records (descriptions, notes, and photographs) resulting from the inventory survey, as well as all cultural materials (artifacts, midden, etc.) and samples (soil, charcoal, etc.) collected during test excavations, have been temporarily housed in the Pacific Legacy Kailua, O‘ahu office. The ultimate disposition of all materials generated by this project will be determined through consultation with the State Historic Preservation Division.

6.0 ARCHAEOLOGICAL SURVEY RESULTS

A total of 72 newly identified archaeological sites comprised of 113 distinct features were documented during the AIS survey (Figure 9 through Figure 12; Table 5) of a quite varied landscape (Figure 13 through Figure 18). Of the 72 sites documented, 22 sites are traditional Hawaiian pre-Contact sites, 40 sites are related to the sugar industry, 7 sites are historic sites not associated with sugar plantation activities, and 3 are military sites.

The original APE for the project began as approximately 450 acres, but was subsequently altered to the current 464 acres. This change in the size of the APE stems from design changes for the wind farm and the desire to avoid several pre-Contact archaeological sites identified on lands not strictly needed for the development of the wind farm. As a result of this APE alteration, seventeen (n=17) of the identified sites (T-039 through T-044, T-046 through T-052, T-060, and T-062 through T-064) are located outside of the revised APE and will not be impacted by the proposed Nā Pua Makani Wind Project. Of these, all except three sites (T-043 [stone lined drainage]; T-060 [concrete ditch], and T-064 Feature A [concrete ditch]) are traditional pre-Contact sites and relate to habitation, agricultural, and burial practices. Pacific Legacy is reporting on these sites in this AIS report because these sites were formally documented and recorded prior to the reduction of the APE. However, no test excavations were conducted in any of these sites, thus it is difficult to assess the significance of these resources. As a result, no recommendations for significance or preservation are made herein regarding the 17 sites outside of the APE. Specific descriptive information, including photographs and maps of each site is presented in Appendix B. A total of 55 archaeological sites are located within the amended APE.

The vast majority of recorded sites within the APE (N=37) were associated with the agricultural development and intensive use for the cultivation of sugar cane by the former Kahuku Plantation (Table 3). The overwhelming majority of sugar plantation related features functioned mainly to control and transport water. A total of 65 features in 36 sites are related to water control and transport (Figure 12). These features include a variety of ditches, metal pipelines, wells, reservoirs, pump houses, and concrete foundations. The ditches are present in several forms, from simple earthen ditches, to stone-lined ditches, to concreted ditches.

The next most common archaeological sites are pre-Contact Native Hawaiian sites (N=8). These consist of terraces, a stone mound, a stone platform, a modified outcrop, and a cave that functioned as habitation sites and areas for the cultivation of traditional crops.

Seven non-sugar plantation historic era sites were also recorded, as were three historic military sites consisting of two World War II defensive military bunkers and one military bivouac area.

The density of sites identified within the 464 acre APE is fairly low; 55 sites in the 464 acre APE computes to one site per 8.4 acres. The density of traditional pre-Contact sites (N=8) in the APE is even lower, with one site per 58.0 acres. The reason for this low density of archaeological sites is undoubtedly due to the massive earth moving operations associated with mechanical

cultivation of sugar cane for the Kahuku Plantation. A large number of surface pre-Contact archaeological sites were undoubtedly destroyed during mechanical clearance of the landscape for sugar cane cultivation.

Of the 55 sites located within the APE, 33 sites (T-007 through T-011, T-014, T-016, T-018, T-019, T-023 through T-027, T-029 through T-033, T-035, T-037, T-038, T-054, T-056, T-057, T-061, T-065 through T-067, T-070, T-071, T-077, and T-078) are recommended to have no further work conducted but are outside of the area of disturbance and will thus not be impacted by construction activities. Twelve sites (T-001, T-002, T-006, T-015, T-021, T-022, T-028, T-034, T-053, T-055, T-059, T-073) are recommended for no further work and are tentatively scheduled to be destroyed. Seven sites are recommended to be preserved (T-003 through T-005, T-017, T-020, T-036, and T-069) based upon their significance. Data recovery excavations are recommended for two sites (T-068 and T-072). Site T-068, a stone terrace, requires excavation to clarify the site function and antiquity. Site T-072, a shelter cave, cannot be avoided by construction activities and is tentatively scheduled to be destroyed. Data recovery excavations will add to our knowledge about traditional use of this portion of the North Shore of O'ahu. Finally, one site (T-074) associated with the Kahuku Plantation contains two features that are recommended to be preserved (Features A and a portion of B) and two features (Features C and D) that require no further work. It is recommended that the entire water aqueduct (Feature A) and approximately half of the adjoining concrete ditch (Feature B) be preserved. The portion of Feature B is being preserved to provide a buffer for Feature A.

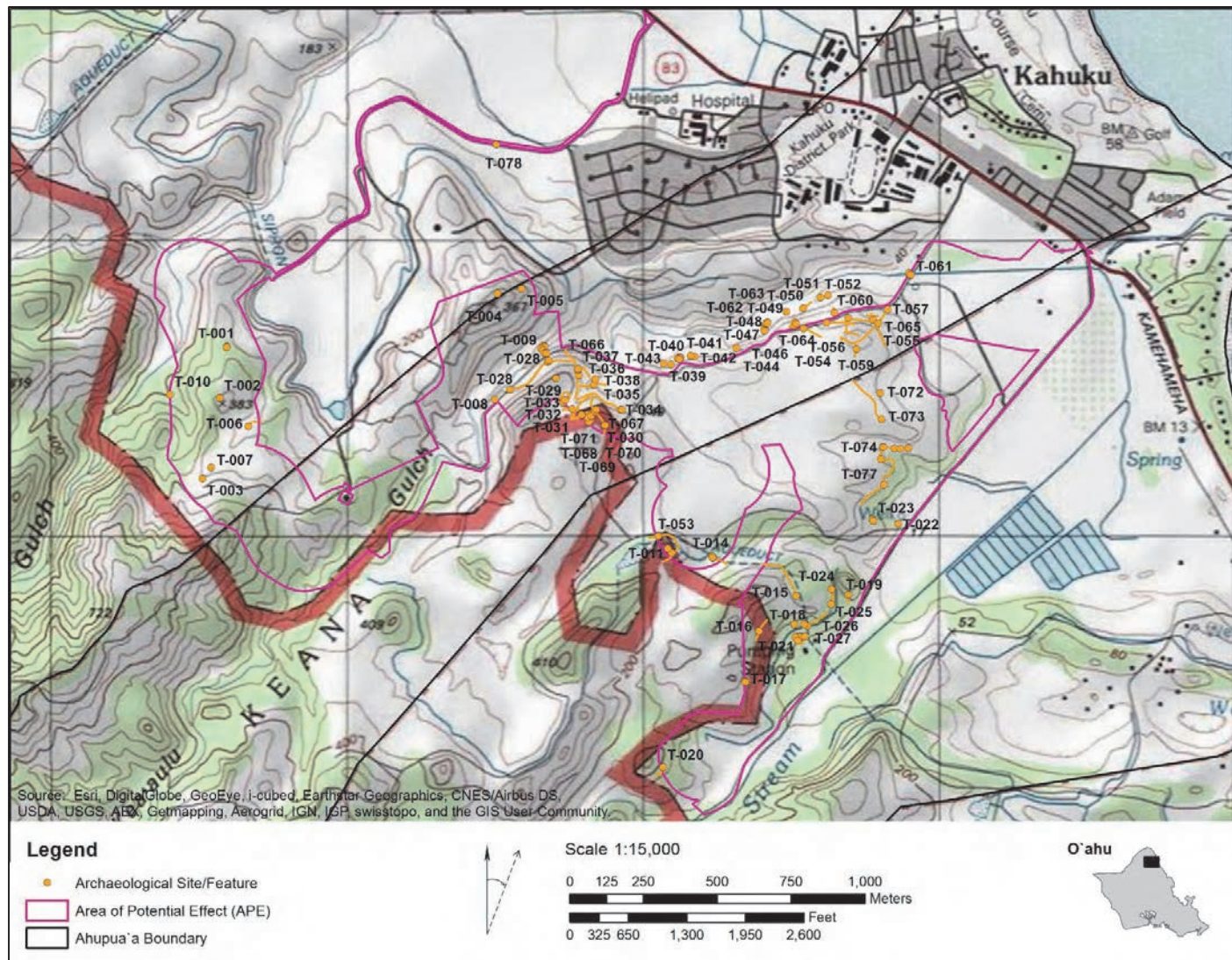


Figure 9. USGS map showing the locations of archaeological sites identified during the current project.

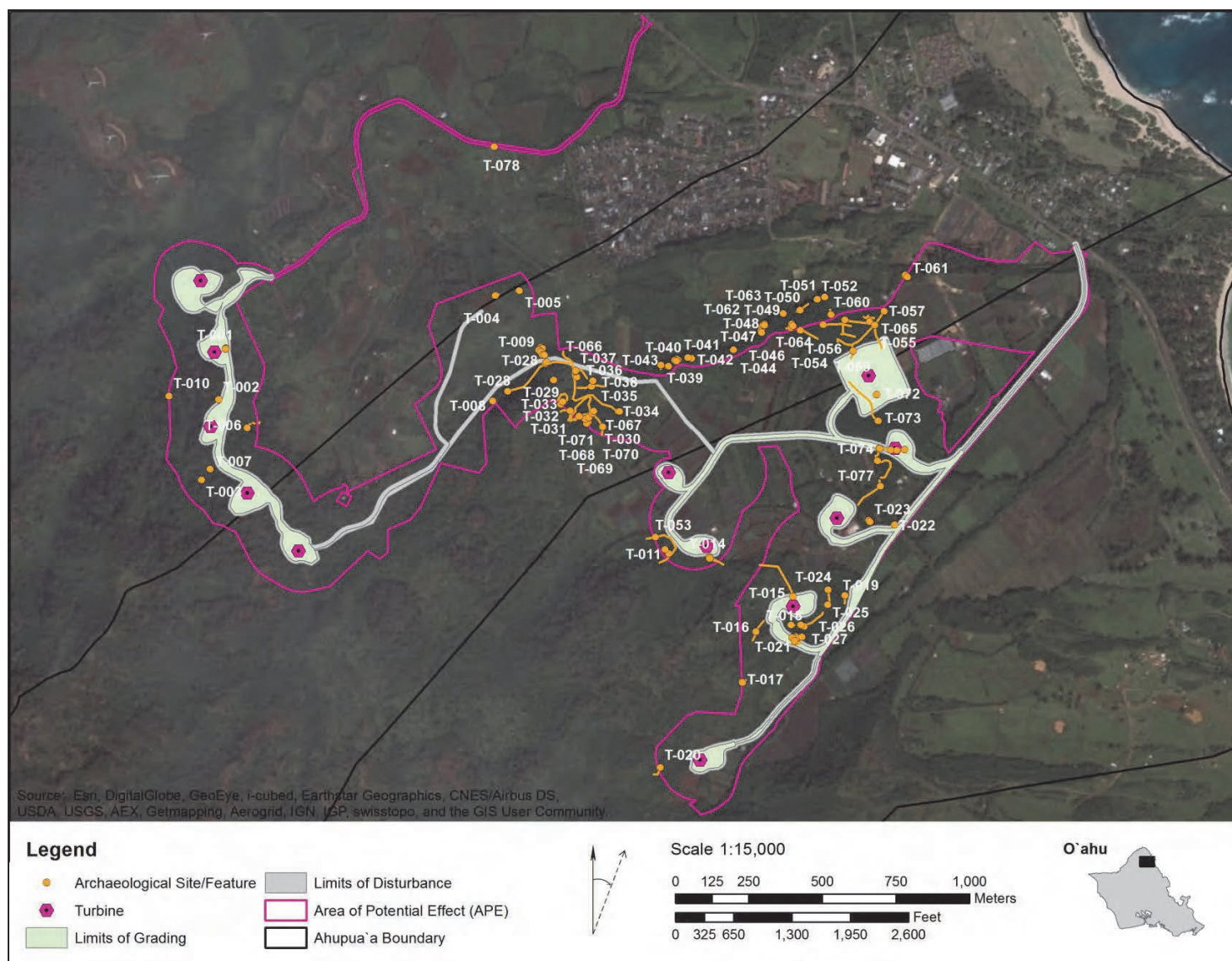


Figure 10. Aerial photograph showing the locations of archaeological sites identified during the current project.

Table 3. Archaeological Sites Recorded During the Current Project

SIHP No.	Temp. No.	Feature	Type	Function	Period	Outside of APE
	T-001	A	Alignment	Bivouac	Historic/Military	
		B	Hearth	Bivouac	Historic/Military	
	T-002	-	Stone Mound	Marker	Traditional	
	T-003	-	Platform	Habitation	Traditional	
	T-004	-	Bunker	Observation	Historic/Military	
	T-005	-	Bunker	Firing Position	Historic/Military	
	T-006	-	Ditch	Water Transport	Historic/Sugar	
	T-007	-	Terrace	Agriculture	Historic	
	T-008	-	Concrete Culvert	Water Control	Historic/Sugar	
	T-009	A	Concrete Foundation	Water Control	Historic/Sugar	
		B	Concrete Foundation	Water Control	Historic/Sugar	
		C	Concrete Foundation	Water Control	Historic/Sugar	
		D	Concrete Foundation	Water Control	Historic/Sugar	
		E	Retaining Wall	Water Control	Historic/Sugar	
	T-010	A	Ditch	Water Transport	Historic/Sugar	
		B	Ditch	Water Transport	Historic/Sugar	
		C	Ditch	Water Transport	Historic/Sugar	
		D	Ditch	Water Transport	Historic/Sugar	
	T-011	A	Valve	Water Control	Historic/Sugar	
		B	Well	Water Control	Historic/Sugar	
	T-014	A	Concrete Foundation	Water Control	Historic/Sugar	
		B	Concrete Ditch	Water Transport	Historic/Sugar	
		C	Iron Pipeline	Water Transport	Historic/Sugar	
	T-015	-	Pipeline	Water Transport	Historic/Sugar	
	T-016	-	Soil Ditch	Water Transport	Historic/Sugar	
	T-017	A	Stone Terrace	Agriculture	Traditional	
		B	Soil Terrace	Agriculture	Traditional	
	T-018	-	Stone/Concrete Ditch	Water Transport	Historic/Sugar	
	T-019	-	Concrete Ditch	Water Transport	Historic/Sugar	
	T-020	-	Terrace	Agriculture	Traditional	
	T-021	A	Storage Area	Water Control	Historic/Sugar	
		B	Concrete Well	Water Control	Historic/Sugar	
		C	Brick Well	Water Control	Historic/Sugar	
		D	Brick Well	Water Control	Historic/Sugar	
		E	Stone/Concrete Wall	Water Control	Historic/Sugar	
		F	Brick Well	Water Control	Historic/Sugar	
	T-022	-	Pump House	Water Control	Historic/Sugar	
	T-023	A	Shed	Storage	Historic	
		B	Concrete Slab	Storage	Historic	
	T-024	-	Concrete Ditch	Water Transport	Historic/Sugar	
	T-025	-	Stone Ditch	Water Transport	Historic/Sugar	
	T-026	-	Stone Retaining Wall	Roadway	Historic/Sugar	
	T-027	-	Stone/Concrete Ditch	Water Transport	Historic/Sugar	
	T-028	A	Soil Ditch	Water Transport	Historic/Sugar	
		B	Concrete Foundations	Water Transport	Historic/Sugar	
	T-029	A	Stone Lined Ditch	Water Transport	Historic/Sugar	
		B	Stone Lined Ditch	Water Transport	Historic/Sugar	
		C	Stone Lined Ditch	Water Transport	Historic/Sugar	

SIHP No.	Temp. No.	Feature	Type	Function	Period	Outside of APE
	T-030	A	Soil Ditch	Water Transport	Historic/Sugar	
		B	Retaining Wall	Water Transport	Historic/Sugar	
		C	Retaining Wall	Water Transport	Historic/Sugar	
		D	Concrete Ditch	Water Transport	Historic/Sugar	
	T-031	-	Terraced Soil Furrows	Agriculture	Historic	
	T-032	-	Terrace	Agriculture	Historic	
	T-033	-	Terraced Soil Furrows	Agriculture	Historic	
	T-034	A	Soil Ditch	Water Transport	Historic/Sugar	
		B	Concrete Footing	Water Control	Historic/Sugar	
	T-035	-	Concrete Ditch	Water Transport	Historic/Sugar	
	T-036	-	Stacked Stone Ditch	Water Transport	Historic/Sugar	
	T-037	-	Concrete Ditch	Water Transport	Historic/Sugar	
	T-038	-	Stone Alignment	Water Transport	Historic/Sugar	
	T-039	A	Overhang Shelter	Habitation	Traditional	X
		B	Terrace	Habitation	Traditional	X
	T-040	A	Terrace	Habitation	Traditional	X
		B	Terrace	Habitation	Traditional	X
		C	Terrace	Habitation	Traditional	X
		D	Terrace	Agriculture	Traditional	X
		E	Terrace	Agriculture	Traditional	X
	T-041	-	Filled Crevice	Poss. Burial	Traditional	X
	T-042	-	Terrace	Agriculture	Traditional	X
	T-043	-	Stone Lined Drainage	Water Control	Historic/Sugar	X
	T-044	-	Terrace	Uncertain	Traditional	X
	T-046	-	Terrace	Agriculture	Traditional	X
	T-047	-	Terrace	Agriculture	Traditional	X
	T-048	-	Wall	Uncertain	Traditional	X
	T-049	-	Wall	Habitation	Traditional	X
	T-050	-	Wall	Uncertain	Traditional	X
	T-051	-	Overhang Shelter	Habitation	Traditional	X
	T-052	-	Wall	Uncertain	Traditional	X
	T-053	-	Reservoir	Water Control	Historic/Sugar	
	T-054	-	Concrete Ditch	Water Transport	Historic/Sugar	
	T-055	-	Concrete Ditch	Water Transport	Historic/Sugar	
	T-056	-	Limestone Ditch	Water Transport	Historic/Sugar	
	T-057	-	Iron Pipeline	Water Transport	Historic/Sugar	
	T-059	-	Concrete Ditch	Water Transport	Historic/Sugar	
	T-060	-	Concrete Ditch	Water Transport	Historic/Sugar	X
	T-061	A	Pump House	Water Control	Historic/Sugar	
		B	Tank	Water Control	Historic/Sugar	
		C	Concrete Ditch	Water Transport	Historic/Sugar	
		D	Concrete Ditch	Water Transport	Historic/Sugar	
	T-062	A	Overhang Shelter	Habitation	Traditional	X
		B	Terrace (Internal)	Habitation	Traditional	X
		C	Terrace (External)	Habitation	Traditional	X
	T-063	A	Cave	Habitation	Traditional	X
		B	Terrace	Habitation	Traditional	X
	T-064	-	Concrete Ditch	Water Transport	Historic/Sugar	X
	T-065	-	Limestone Ditch	Water Transport	Historic/Sugar	
	T-066	-	Stacked Stone Ditch	Water Transport	Historic/Sugar	

SIHP No.	Temp. No.	Feature	Type	Function	Period	Outside of APE
	T-067	-	Modified Outcrop	Uncertain	Traditional	
	T-068	-	Stone Terrace	Uncertain	Traditional	
	T-069	A	Terrace	Habitation	Traditional	
		B	Terrace	Agriculture	Traditional	
	T-070	-	Artifact Scatter	Dump	Historic	
	T-071	-	Terraced Soil Furrows	Agriculture	Historic	
	T-072	-	Cave	Habitation	Traditional	
	T-073	-	Concrete Ditch	Water Transport	Historic/Sugar	
	T-074	A	Aqueduct	Water Transport	Historic/Sugar	
		B	Concrete Ditch	Water Transport	Historic/Sugar	
		C	Soil Ditch	Water Transport	Historic/Sugar	
		D	Limestone Retaining Wall	Water Transport	Historic/Sugar	
		E	Concrete Ditch	Water Transport	Historic/Sugar	
	T-077	-	Soil Ditch	Water Transport	Historic/Sugar	
	T-078	-	Concrete Ditch	Water Transport	Historic/Sugar	

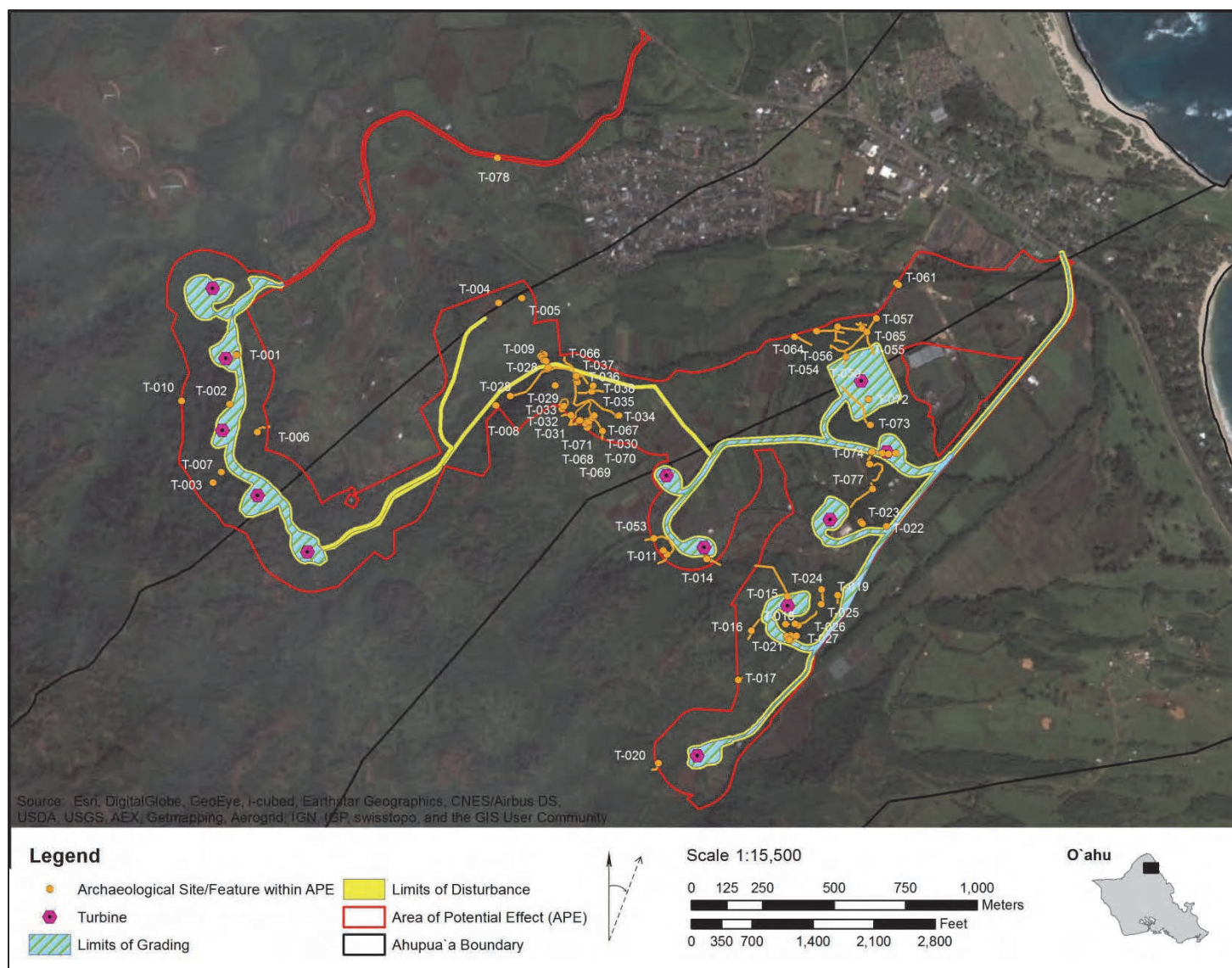


Figure 11. Aerial photograph showing the locations of archaeological sites within APE.

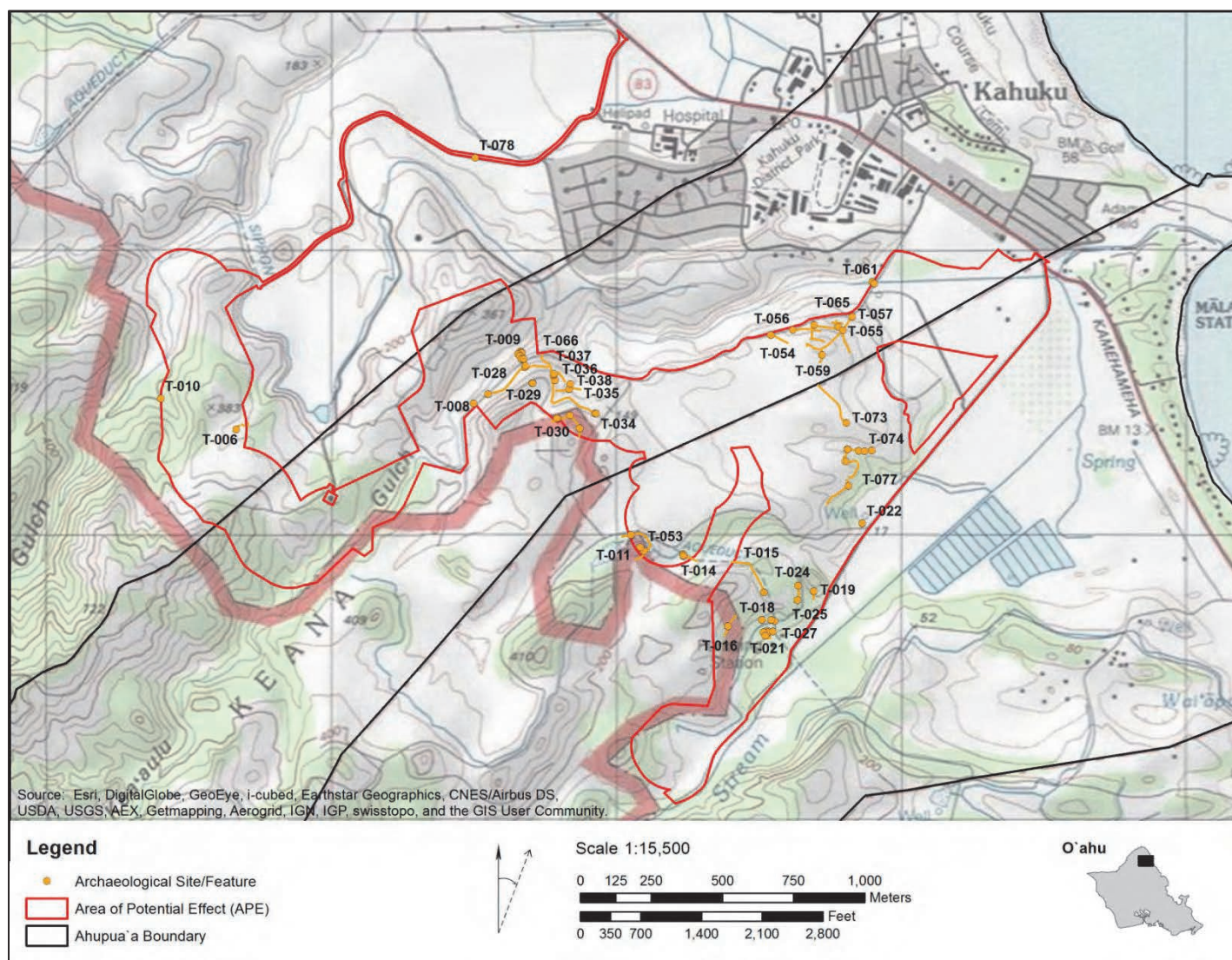


Figure 12. USGS map showing distribution of sugar plantation water transportation and control features.



Figure 13. Overview of central portion of project area.



Figure 14. Overview of project area and active agricultural lands.



Figure 15. Overview of eastern-most portion of the project area.



Figure 16. View of Ōhi‘a‘ai Gulch.



Figure 17. Area of exposed sand in the northeastern portion of the project area.



Figure 18. Close-up of exposed sand.

7.0 SUBSURFACE TESTING RESULTS

Subsurface mechanical backhoe testing and hand excavated test units were placed at various locations throughout the project area (Figure 19). A total of 16 mechanically excavated trenches were placed throughout the project area with the focus of the testing being in those areas where heavy ground disturbance would take place during the proposed construction of the wind farm (Figure 20). None of the trenches excavated uncovered any cultural deposits or remains. Detailed information regarding each trench excavation is located in Appendix D. No subsurface testing was conducted within the active farm lots on the MHW lands to the east (so as to not disturb or excavate active farming), however, one test trench was placed within an active farm lot along the roadway within the DOA controlled lands on the west side of the APE. This trench (Trench 14) was placed in an area where the proposed road realignment may occur.

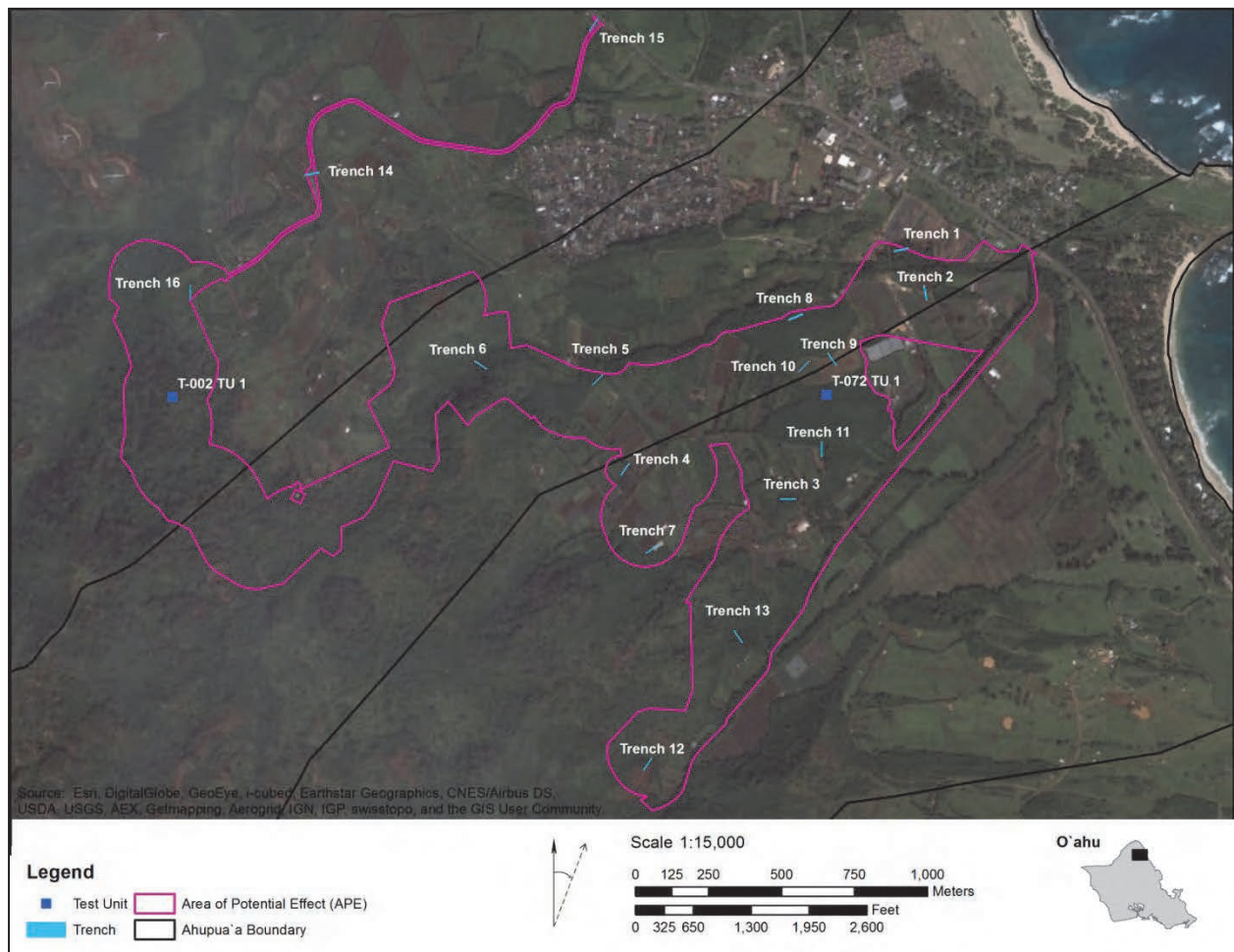


Figure 19. Locations of test trenches and test units within the APE.



Figure 20. Trench excavations were conducted throughout the project area.

Two controlled hand-excavated test units were excavated at two sites (T-002, mound and T-072, cave). They were excavated with trowel, brush, and dustpan and all soil was screened through nested 1/4 and 1/8 inch mesh screens. Any cultural material identified was collected, bagged by provenience, and transported back to the Pacific Legacy laboratory in Kailua for processing and further analysis. The excavations were documented with notes on standard excavation forms. Profiles were drawn and the excavation was recorded with digital images. Two collected charcoal samples were submitted for identification and radiocarbon dating.

7.1 SITE T-002

The excavations conducted at Site T-002 (stone mound) were conducted because it was thought that the stone mound could potentially contain a human burial. The mound is located on top a ridgeline on the west side of the APE. The 1x1 meter test unit was placed on the west side of the mound in order to bisect the stone feature (Figure 21 and Figure 22). The excavation proceeded with the removal of surface rocks within the test unit. Excavation proceeded to a depth of 63 cm below surface. Three natural stratigraphic layers were revealed (Table 6; Figure 23). These natural layers consisted of two layers of silty clay overlaying a clay layer.

No cultural remains, artifacts, or human remains were encountered during the excavation at Site T-002.



Figure 21. Site T-002, Test Unit 1. Prior to excavation, view to east.



Figure 22. Site T-002, Test Unit 1, post excavation, view to east.

Table 4. Soils Descriptions for Site T-002, Test Unit 1

Layer	Depth (cm below surface)	Description
Layer I	0-6	Dark yellowish brown (5YR 2/2) silt loam; very fine grain, structureless; non-sticky, non-plastic; abrupt boundary. Contains leaf litter.
Layer II	3-26	Dark brown (7.5YR 3/3) silt loam; very fine grain, structureless; non-sticky, non-plastic; clear boundary.
Layer III	14-63	Yellowish red (5YR 4/6) clay; blocky, fine; non-sticky, non-plastic. Contains decaying rocks.

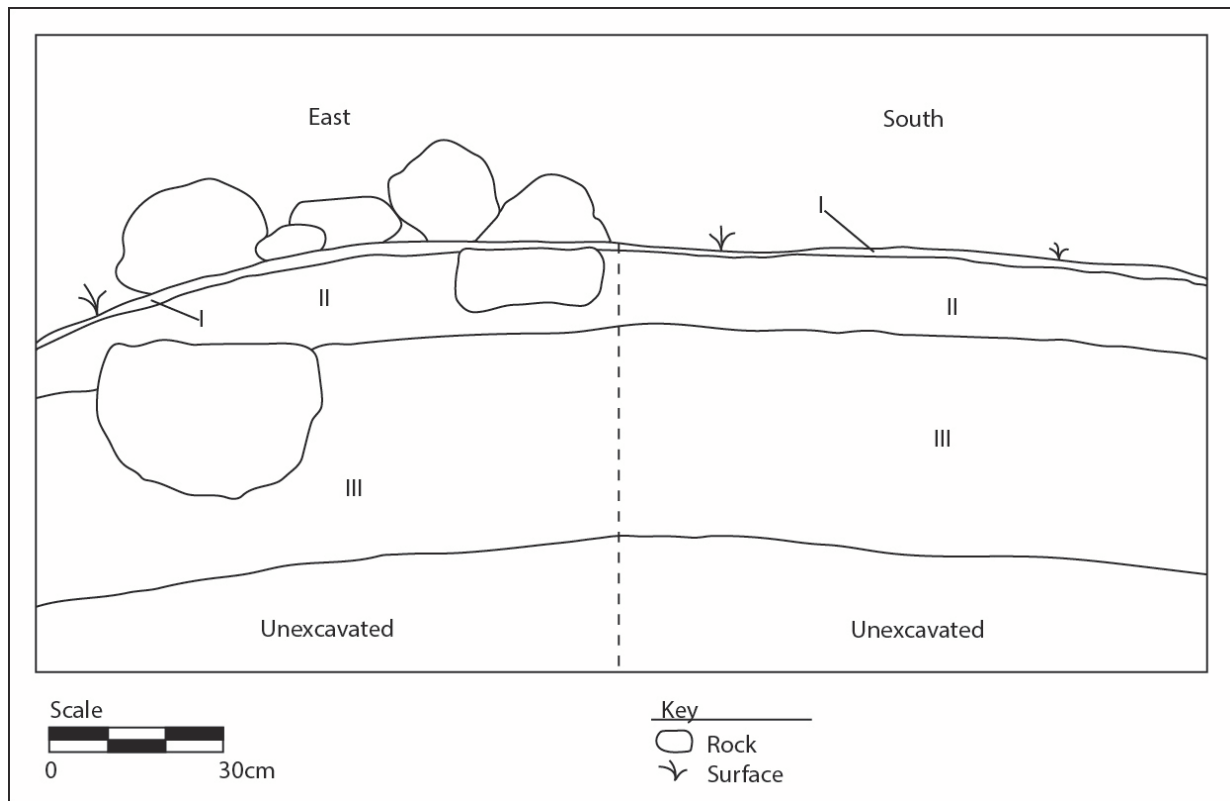


Figure 23. Soil profile of Test Unit 1 at Site T-002.

7.2 SITE T-072

A single 50x50 cm test unit was excavated at the rear of the cave at Site T-072 (Figure 24 and Figure 25). The test unit was placed at this site because marine shell midden and non-human animal bone were observed on the surface of the cave. Given the tight space and low ceiling within the cave along with the smaller entrance, it was thought that a smaller 50x50 cm unit would be best excavated at the site.

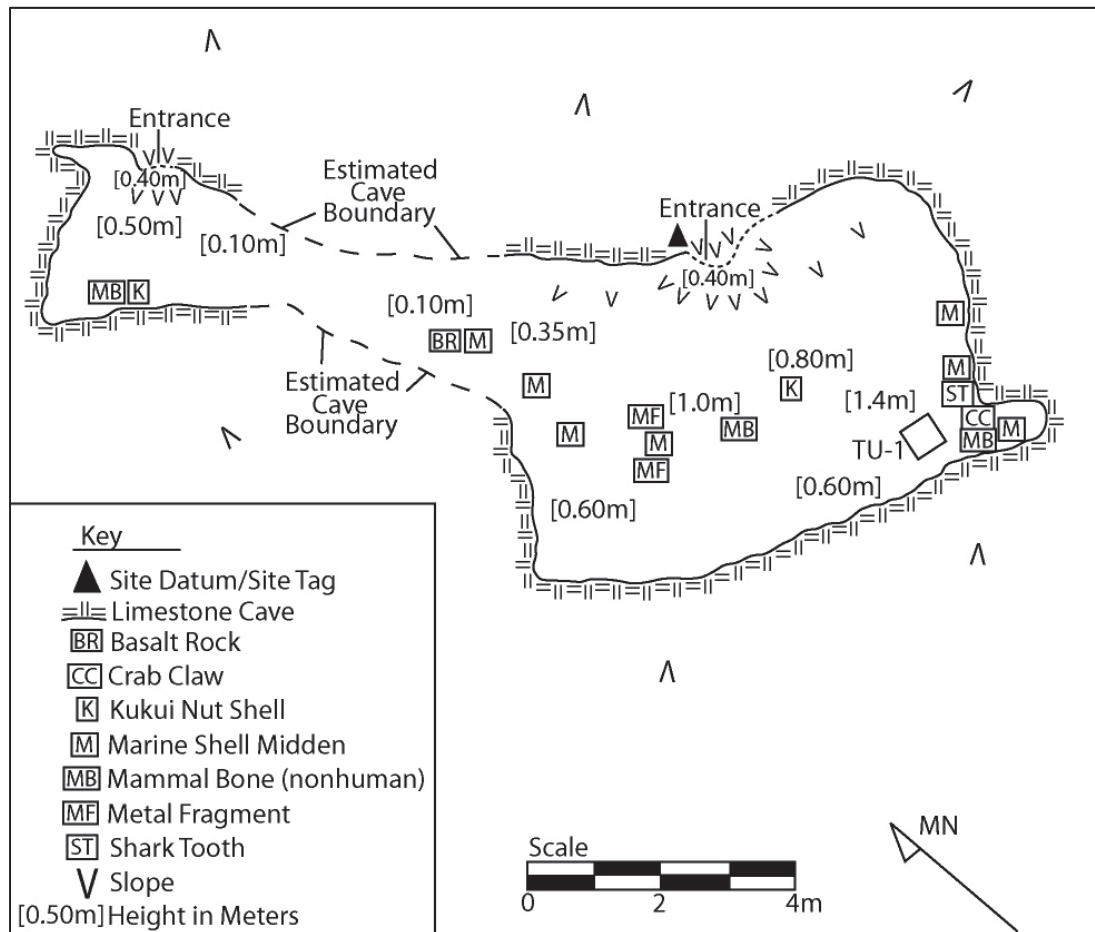


Figure 24. Plan view of Site T-072.

Excavations revealed a significant cultural deposit within the cave. Two silt layers were identified during the excavations (Table 7 and Figure 26). Two metal artifacts were recovered from Layer I, level 1 of the unit – a miniature metal picture frame and a metal button post.

Abundant marine shell midden was collected throughout the excavation. The majority of shell midden was recovered between Layer I, level 2 and Layer II, level 1. The midden was also associated with four basalt flakes recovered from Layer I, level 2. Two charcoal samples were collected in situ and submitted for dating. Both samples were recovered from Layer I, level 2 (ca. 22 cmbd and 37 cmbd). The radiocarbon dates spanned AD 1650 to Post 1950. However, given the lack of historic material in the lower level, we can conclude a date of AD 1650 to 1815 for this site.

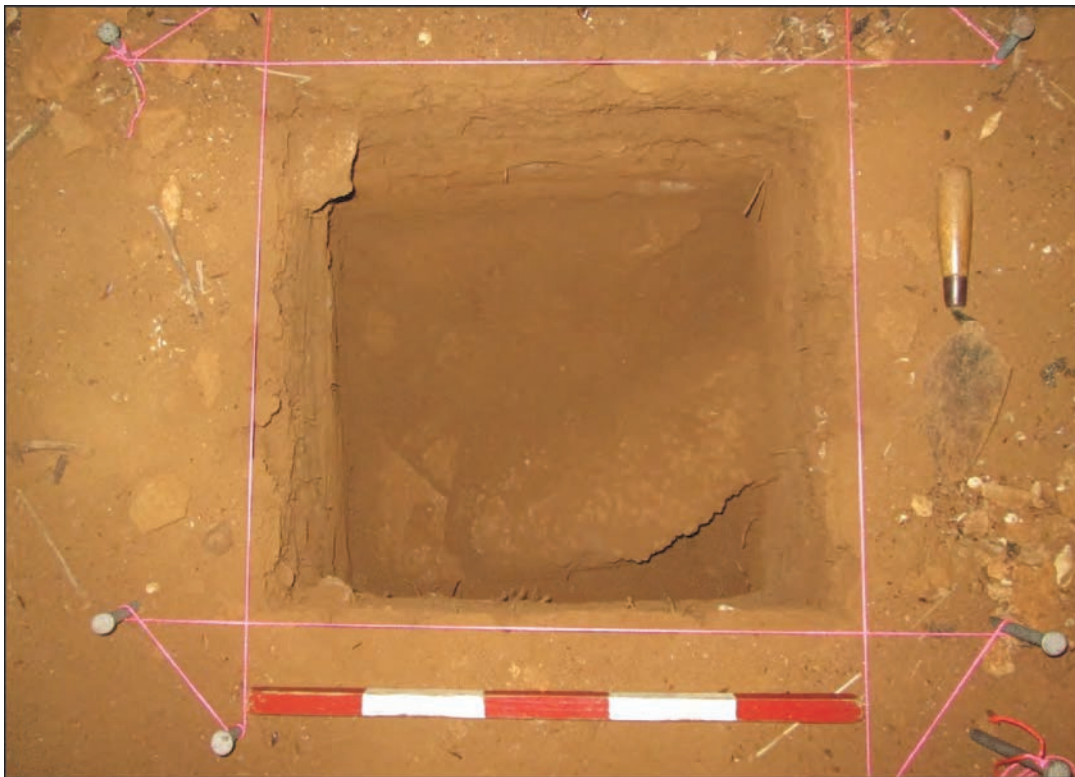


Figure 25. Site T-072, Test Unit 1, pre- and post-excavation photographs.

Table 5. Soil Descriptions for Site T-072, Test Unit 1

Layer	Depth (cm below datum)	Description
Layer I	10-40	Dark yellowish brown (10YR 3/6) silt. Moderate, fine grain; slightly sticky, plastic, weakly cemented; abrupt boundary. Contains cultural material: midden, non-human bone, basalt flakes, metal artifacts.
Layer II	30-70	Strong brown (7.5YR 4/6) silt. Moderate, fine blocky; slightly sticky, non-plastic, weakly cemented. Contains cultural material near the top of the layer.

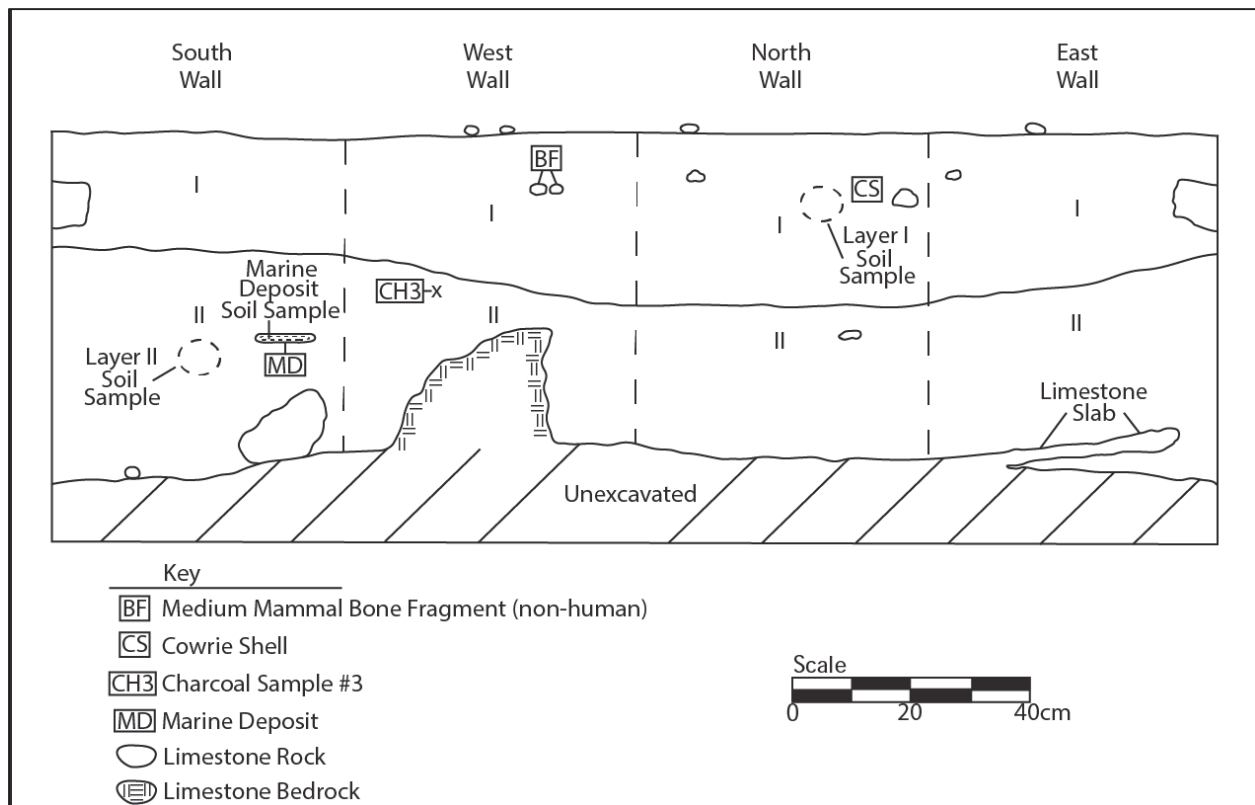


Figure 26. Profiles from Site T-072, Test Unit 1.

8.0 LABORATORY RESULTS

8.1 ARTIFACT ANALYSIS

Site T-063

Three traditional Hawaiian artifacts were recovered from Site T-063 (cave). Although no excavation was conducted at the site since it was located outside of the revised APE boundary, three artifacts were collected by the field crew for security reasons. The artifacts were very recognizable and visible in the cave and the archaeological crew worried that they might be looted, so were collected. The three traditional artifacts retrieved from the surface of the cave consisted of two basalt adzes and a limestone hammerstone and are described below, summarized in Table 8, and illustrated in Figure 27 through Figure 29).

Artifact 1. Basalt Adze (Figure 27). Consists of a large tanged quadrangular adze manufactured out of fine grain, dense, dark gray basalt. The front, sides, and back of the blade are ground and polished. The tang is partially ground and polished on the sides and back. The back of the poll is not ground or polished. The blade length relative to the length of the tang appears shorter than the typical adze of this size, which suggests that it may have originally been longer and possibly reworked after its original manufacture. It measures 197.5 mm in length, 45.2 mm in width, 40.5 mm in thickness, and weighs 329.5 grams. The cutting edge is 45.0 mm wide.

Artifact 2. Limestone Hammerstone (Figure 28). Consists of a discoidal hammerstone manufactured out of limestone. The edges are rounded and battered from hammering. The sides are slightly concave. It measures 75.9 mm in length, 75.6 mm in width, 39.0 mm in thickness, and weighs 270.6 grams.

Artifact 3. Basalt Adze (Figure 29). Consists of a small tanged quadrangular adze manufactured out of fine grain, dense, dark gray basalt. The front, sides, and back of the blade are ground and polished. The tang is partially ground and polished on the sides and back. The back of the poll is not ground or polished. It measures 88.3 mm in length, 26.7 mm in width, 18.1 mm in thickness, and weighs 82.6 grams. The cutting edge is 30.2 mm wide.



Figure 27. Large basalt quadrangular adze collected from Site T-063.



Figure 28. Limestone hammerstone recovered from Site T-063.



Figure 29. Small basalt quadrangular adze recovered from Site T-063.

Table 6. Artifacts Recovered from the Surface of Site T-063

Artifact No.	Site No.	Bag No.	Material	Description	Qty (MNI)	L (mm)	W/Diam (mm)	Th (mm)	Wt (g)	Age	Cond.	Comments
1	T-063	001	Lithic	Basalt Adze	1	197.5	45.2	40.5	329.5	Pre-Contact	good	Large tanged quadrangular adze manufactured out of fine grain, dense, dark gray basalt; front, sides, and back are ground and polished; tang is partially ground and polished on the sides and back; back face of poll is not ground or polished; the blade length relative to the length of the tang appears shorter than the typical adze of this size, which suggests that it may have originally been longer and possibly reworked after its original manufacture. The cutting edge is 45.0 mm wide.
2	T-063	002	Lithic	Limestone Hammerstone	1	75.9	75.6	39.0	270.6	Pre-Contact	good	Discoidal hammerstone manufactured out of limestone; the edges are rounded and battered from hammering; the sides are slightly concave
3	T-063	003	Lithic	Basalt Adze	1	88.3	26.7	18.1	82.6	Pre-Contact	good	Small tanged quadrangular adze manufactured out of fine grain, dense, dark gray basalt; front, sides, and back are ground and polished; tang is partially ground and polished on the sides and back; back face of poll is not ground or polished. The cutting edge is 30.2 mm wide.

Site T-072

A total of six artifacts were collected from Test Unit 1 (Table 9), consisting of a miniature metal picture frame, a copper button post, and four basalt flakes. The two historic metal artifacts were collected from Layer I, level 1, while the four traditional basalt flakes were collected from Layer I, level 2. General artifact descriptions for each of the artifacts are presented below.

Artifact 1. Miniature metal picture frame (Figure 30a and b). This two-piece oval miniature picture frame measures overall 27.9 mm long by 22.2 mm wide by 3.3 mm thick, and weighs 2.9 grams. The opening for the picture measures 14.4 mm by 8.9 mm. The front and back of the frame are held together by four pinch clasps.

Artifact 2. Metal button post (Figure 31). This copper button post measures 9.5 mm in length and weighs 2.0 grams. The post has a diameter of 4.0 mm; the back disk has a diameter of 9.4 mm and the front disk has a diameter of 11.2 mm. The front disk is slightly concave and exhibits a metal protrusion that probably anchored a ceramic (or other decorative material) face.

Also collected during the excavation at Site T-072, Test Unit 1 were four basalt flakes all recovered from Layer I, level 2 (20-30 cmbd). Artifact 3 was recovered *in situ* from 21 cmbd. The remaining flakes were collected from the screen.

Artifact 3. Basalt Flake (Figure 32). Medium grain, medium gray basalt flake with some cortex present on dorsal surface. Measures 53.6 mm in length, 63.0 mm in width, 12.0 mm in thickness, and weighs 54.5 grams.

Artifact 4. Basalt Flake (Figure 32). Fine grain, dark red basalt flake with no cortex present. Measures 12.7 mm in length, 17.5 mm in width, 3.8 mm in thickness, and weighs 0.5 grams.

Artifact 5. Basalt Flake (Figure 32). Fine grain, dark red basalt flake with no cortex present. Measures 14.1 mm in length, 19.4 mm in width, 3.2 mm in thickness, and weighs 0.8 grams.

Artifact 6. Basalt Flake (Figure 32). Medium grain, medium gray basalt flake with no cortex present. Measures 16.7 mm in length, 19.5 mm in width, 3.2 mm in thickness, and weighs 1.3 grams.



Figure 30a and b. Artifact 1, miniature metal picture frame recovered from Site T-072, Test Unit 1.

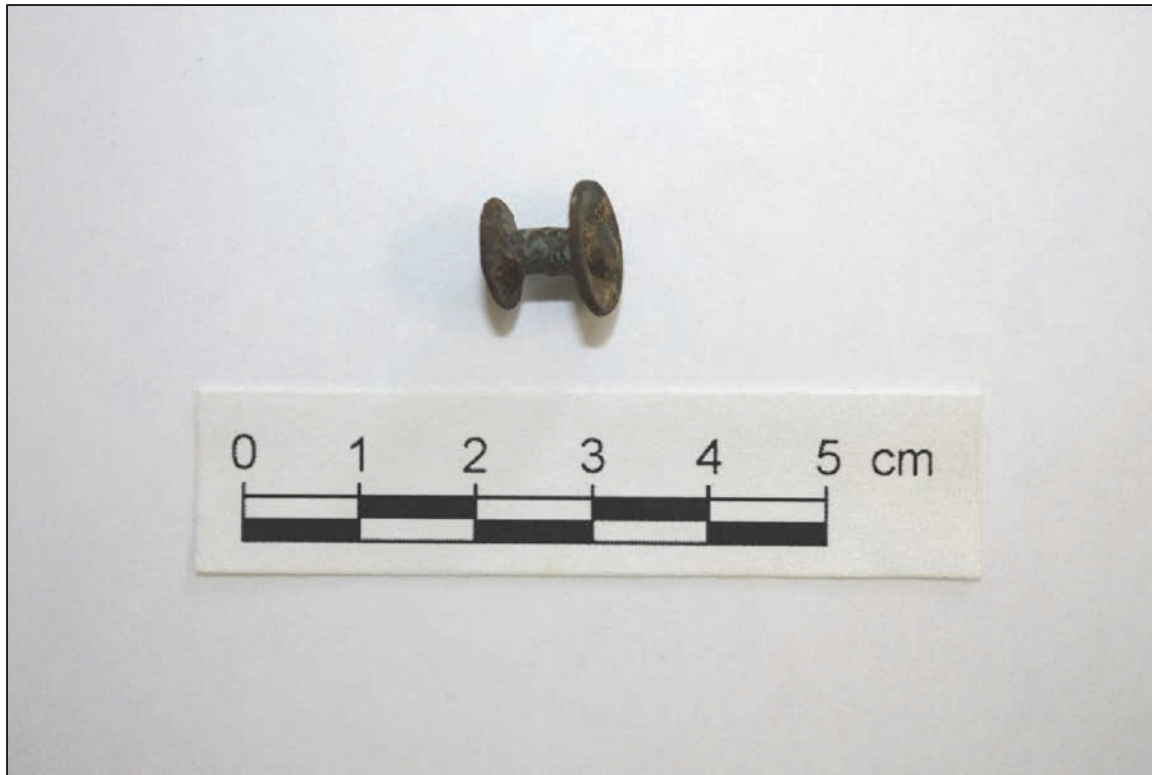


Figure 31. Artifact 2, metal button post recovered from Site T-072, Test Unit 1.



Figure 32. Basalt flakes recovered from Site T-072, Test Unit 1 (Artifacts Nos. 3-6 [left to right]).

Table 7. Artifacts Recovered from Site T-072, Test Unit 1

Artifact No.	Bag No.	Site No.	Unit	Layer/level	CMBD	Material	Description	Qty (MNI)	L (mm)	W/ Diam. (mm)	Th. mm	Wt (g)	Age	Cond.	Comments
1	5	T-072	TU-1	I / 1	16	Metal	Picture Frame	1	27.9	22.2	3.3	2.9	Historic	fair	Miniature metal picture frame
2	8	T-072	TU-1	I /1	10-21	Metal	Button Post	1	9.5			2.0	Historic	fair	Metal button post
3	10	T-072	TU-1	I /2	21	Lithic	Basalt Flake	1	53.6	63.0	12.0	54.5	Pre-Contact	good	Medium grain, medium gray basalt; some cortex on dorsal surface
4	15	T-072	TU-1	I /2	20-30	Lithic	Basalt Flake	1	12.7	17.5	3.8	0.5	Pre-Contact	good	Fine grain, dark red basalt; no cortex
5	15	T-072	TU-1	I /2	20-30	Lithic	Basalt Flake	1	14.1	19.4	3.2	0.8	Pre-Contact	good	Fine grain, dark red basalt; no cortex
6	15	T-072	TU-1	I	20-30	Lithic	Basalt Flake	1	16.7	19.5	3.2	1.3	Pre-Contact	good	Medium grain, medium gray basalt; no cortex

8.2 MIDDEN ANALYSIS

Midden is human food refuse comprised of marine shell, non-human bone generally consisting of remains from dog, pig, chicken, wild birds, and fish, as well as macrobotanical remains. Midden remains were a major component of cultural materials collected from the excavation of Test Unit 1 Site T-072. Overall, a total of 193.3 grams of midden was recovered from the test excavation unit. The most frequent midden type is marine shell, comprising 162.7 g (84.2%) of the total midden assemblage, followed by non-human bone (28.9 g; 15.0%), and flora (1.7 g; 0.9%) (Table 10).

Out of the total 193.3 grams that constitutes the midden assemblage, the marine shell is predominantly comprised of Gastropoda, or sea snail (71.8 g; 37.1%), followed by Malacostraca, or crustacean (45.4 g; 23.5%), Bivalvia, or bivalve (23.9 g; 12.4%), and Echinoidea, or sea urchin (21.6 g; 11.2%) (Table 11). The non-human bone is dominated by Mammalia, or mammal (25.3 g; 13.1%), followed by Osteichthyes, or bony fish (3.2 g; 1.7%), and Aves, or bird (0.4 g; 0.2%). The flora consists of Euphorbiaceae, or spurge (1.7 g; 0.9%).

Midden was collected from every level during the excavation of Site T-072, Test Unit 1 (Figure 33). The majority of midden was collected from Layer I, level 2 (70.4 g; 36.4%), followed by Layer I, level 3 (39.5 g; 20.4 %), Layer I, level 1 (25.6 g; 13.2 %), Layer II, level 3 (22.4 g; 11.6%), Layer II, level 2 (21.1 g; 10.9%), Layer II, level 1 (8.9 g; 4.6%), Layer II, level 4 (4.3 g; 2.2%), and the surface (1.1 g; 0.6%).

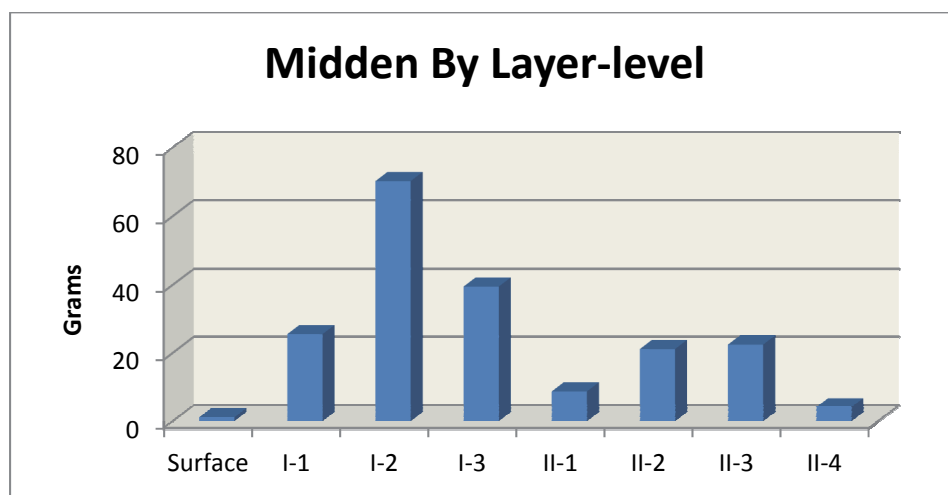


Figure 33. Distribution of total midden by layer and level.

Midden constituents from Layer I total 136.6 g, which are 70.7% of the total midden recovered. Marine and crab shell make up the majority of the midden recovered from Layer I (109.4 g; 80.1%). This is followed by non-human bone (25.5 g; 18.7%) and kukui (*Aleurites*) endocarp (1.7 g; 1.2%). Gastropods make up the overall majority of marine shell midden recovered from Layer I. The crab shell only makes up 2.1 g of the 109.4 grams of crab and marine shell (1.9%).

Table 8. Midden Recovered from T-072, Test Unit 1

	Surface		Layer – level														Totals	
			I-1		I-2		I-3		II-1		II-2		II-3		II-4			
BONE	Wt. (g)	Unit %	Wt. (g)	Unit %	Wt. (g)	Unit %	Wt. (g)	Unit %	Wt. (g)	Unit %	Wt. (g)	Unit %	Wt. (g)	Unit %	Wt. (g)	Unit %	Wt. (g)	Unit %
Aves	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.4	0.2%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.4	0.2%
Unid. Aves spp.	-	-	-	-	-	-	0.4	0.2%	-	-	-	-	-	-	-	-	0.4	0.2%
Mammalia	1.1	0.6%	8.8	4.6%	12.4	6.4%	0.0	0.0%	0.0	0.0%	1.8	0.9%	1.2	0.6%	0.0	0.0%	25.3	13.1%
Rattus exulans	-	-	0.1	0.1%	0.1	0.1%	-	-	-	-	-	-	-	-	-	-	0.2	0.1%
Unid. Med. Mammal spp.	1.1	0.6%	8.5	4.4%	11.1	5.7%	-	-	-	-	1.8	0.9%	1.2	0.6%	-	-	23.7	12.3%
Unid. Med. Mammal spp., burnt	-	-	-	-	0.9	0.5%	-	-	-	-	-	-	-	-	-	-	0.9	0.5%
Unid. Small Mammal spp.	-	-	0.2	0.1%	0.3	0.2%	-	-	-	-	-	-	-	-	-	-	0.5	0.3%
Osteichthyes	0.0	0.0%	0.7	0.4%	0.8	0.4%	1.3	0.7%	0.4	0.2%	0.0	0.0%	0.0	0.0%	0.0	0.0%	3.2	1.7%
Unid. Osteichthyes spp.	-	-	0.7	0.4%	0.8	0.4%	1.3	0.7%	0.4	0.2%	-	-	-	-	-	-	3.2	1.7%
Bone Totals	1.1	0.6%	9.5	4.9%	13.2	6.8%	1.7	0.9%	0.4	0.2%	1.8	0.9%	1.2	0.6%	0.0	0.0%	28.9	15.0%
MARINE SHELL	Wt. (g)	Unit %	Wt. (g)	Unit %	Wt. (g)	Unit %	Wt. (g)	Unit %	Wt. (g)	Unit %	Wt. (g)	Unit %	Wt. (g)	Unit %	Wt. (g)	Unit %	Wt. (g)	Unit %
Bivalvia	0.0	0.0%	9.1	4.7%	3.5	1.8%	8.1	4.2%	3.1	1.6%	0.1	0.1%	0.0	0.0%	0.0	0.0%	23.9	12.4%
Isognomonidae spp.	-	-	-	-	1.9	1.0%	5.0	2.6%	3.0	1.6%	-	-	-	-	-	-	9.9	5.1%
Mytilidae spp.	-	-	-	-	1.6	0.8%	3.1	1.6%	0.1	0.1%	0.1	0.1%	-	-	-	-	4.9	2.5%
Unid. Bivalvia spp.	-	-	9.1	4.7%	-	-	-	-	-	-	-	-	-	-	-	-	9.1	4.7%
Echinoidea	0.0	0.0%	0.9	0.5%	11.4	5.9%	9.3	4.8%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	21.6	11.2%
Unid. Echinoidea spp.	-	-	0.1	0.1%	7.6	3.9%	7.3	3.8%	-	-	-	-	-	-	-	-	15.0	7.8%
Unid. Echinoidea Radula	-	-	0.8	0.4%	3.8	2.0%	2.0	1.0%	-	-	-	-	-	-	-	=	6.6	3.4%
Gastropoda	0.0	0.0%	5.2	2.7%	41.8	21.6%	18.0	9.3%	0.7	0.4%	0.5	0.3%	5.4	2.8%	0.2	0.1%	71.8	37.1%
Conidae spp.	-	-	1.1	0.6%	3.1	1.6%	3.2	1.7%	-	-	-	-	-	-	-	-	7.4	3.8%
Cypraeidae spp.	-	-	0.2	0.1%	7.3	3.8%	3.3	1.7%	-	-	-	-	-	-	-	-	10.8	5.6%
Nerita picea	-	-	1.1	0.6%	9.2	4.8%	2.8	1.4%	0.1	0.1%	-	-	-	-	-	-	13.2	6.8%
Patellidae spp.	-	-	-	-	-	-	0.2	0.1%	-	-	-	-	-	-	-	-	0.2	0.1%
Strombidae spp.	-	-	-	-	11.6	6.0%	5.1	2.6%	0.1	0.1%	-	-	-	-	-	-	16.8	8.7%
Thaididae spp.	-	-	-	-	0.3	0.2%	0.5	0.3%	-	-	-	-	-	-	-	-	0.8	0.4%
Trochidae spp.	-	-	-	-	0.1	0.1%	0.3	0.2%	-	-	0.5	0.3%	5.4	2.8%	-	-	6.3	3.3%
Turbinidae spp.	-	-	-	-	8.9	4.6%	2.2	1.1%	0.5	0.3%	-	-	-	-	-	-	11.6	6.0%
Unid. Gastropoda spp.	-	-	0.3	0.2%	1.0	0.5%	-	-	-	-	-	-	-	-	0.2	0.1%	1.5	0.8%
Unid. Gastropoda, operculum	-	-	0.7	0.4%	0.3	0.2%	-	-	-	-	-	-	-	-	-	-	1.0	0.5%
Unid. Land Snail	-	-	1.8	0.9%	-	-	0.4	0.2%	-	-	-	-	-	-	-	-	2.2	1.1%
Malacostraca	0.0	0.0%	0.0	0.0%	0.0	0.0%	2.1	1.1%	4.7	2.4%	18.7	9.7%	15.8	8.2%	4.1	2.1%	45.4	23.5%
Carpiliidae spp.	-	-	-	-	-	-	2.1	1.1%	4.7	2.4%	18.7	9.7%	15.8	8.2%	4.1	2.1%	45.4	23.5%
Shell Totals	0.0	0.0%	15.2	7.9%	56.7	29.3%	37.5	19.4%	8.5	4.4%	19.3	10.0%	21.2	11.0%	4.3	2.2%	162.7	84.2%
FLORA	Wt. (g)	Unit %	Wt. (g)	Unit %	Wt. (g)	Unit %	Wt. (g)	Unit %	Wt. (g)	Unit %	Wt. (g)	Unit %	Wt. (g)	Unit %	Wt. (g)	Unit %	Wt. (g)	Unit %
Euphorbiaceae	0.0	0.0%	0.9	0.5%	0.5	0.3%	0.3	0.2%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	1.7	0.9%
Aleurites moluccana	-	-	0.9	0.5%	-	-	-	-	-	-	-	-	-	-	-	-	0.9	0.5%
Aleurites moluccana, burnt	-	-	-	-	0.5	0.3%	0.3	0.2%	-	-	-	-	-	-	-	-	0.8	0.4%
Flora Totals	0.0	0.0%	0.9	0.5%	0.5	0.3%	0.3	0.2%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	1.7	0.9%
Totals	1.1	0.6%	25.6	13.2%	70.4	36.4%	39.5	20.4%	8.9	4.6%	21.1	10.9%	22.4	11.6%	4.3	2.2%	193.3	100.0%

The midden constituents from Layer II are much different. Total midden from Layer II is 56.7 g, or 29.3% of the total midden recovered from the test unit. The overwhelming majority of this midden is made up of crab claws and carapace. Crab remains from Layer II total 43.3 g or 76.4% of the total midden from Layer II. The remaining midden from Layer II is composed of a few gastropod and bivalve shells.

The remarkable aspect of the Layer II midden is the size and robust nature of the crab claws recovered. Figure 34 shows two of the better preserved and more complete claws recovered. These two claws are from Layer II, level 2. The significance of these claws is uncertain at this time, but their uniqueness needs recognition, because such findings are rare.

Table 9. Weight (g) of Midden Recovered from Test Unit 1, Site T-072, Sorted by Level

	Surface	I-1	I-2	I-3	II-1	II-2	II-3	II-4	Totals
Aves	0	0	0	0.4	0	0	0	0	0.4
Mammalia	1.1	8.8	12.4	0	0	1.8	1.2	0	25.3
Osteichthyes	0	0.7	0.8	1.3	0.4	0	0	0	3.2
Bivalvia	0	9.1	3.5	8.1	3.1	0.1	0	0	23.9
Echinoidea	0	0.9	11.4	9.3	0	0	0	0	21.6
Gastropoda	0	5.2	41.8	18	0.7	0.5	5.4	0.2	71.8
Malacostraca	0	0	0	2.1	4.7	18.7	15.8	4.1	45.4
Euphorbiaceae	0	0.9	0.5	0.3	0	0	0	0	1.7
	1.1	25.6	70.4	39.5	8.9	21.1	22.4	4.3	193.3



Figure 34. Photograph of crab claws recovered from Layer II, level 1.

8.3 WOOD IDENTIFICATION

Prior to submitting a charcoal sample for radiometric analyses, two wood charcoal samples were submitted to the Wood Identification Laboratory at the International Archaeological Research Institute, Inc. for species identification. Each sample was examined and identified by academically trained wood analyst Gail Murakami. The purpose of this analysis was to determine the presence or absence of historically introduced wood and to differentiate between short lived and long lived species. The intent was to be able to factor out possible long lived species, thus controlling for the “old wood effect” (Tuggle and Spriggs 2001:169).

Since radiocarbon analysis measures the radioactive decay of carbon 14 following the death of an organism, a primary assumption of radiometric dating is that the organism’s time of death is also the time at which it ceased absorbing carbon 14 through exchange with the atmosphere. In dating a piece of wood or charcoal, however, the event dated is the growth of the individual tree ring, not necessarily the death of the tree. Trees grow by the addition of concentric rings, and each of these rings stops exchanging carbon with the biosphere once it is overlain by the next ring. As a result, if the tree is a long lived species, the radiocarbon age of the rings of its heartwood may differ significantly from the age of the rings of its sapwood. A date obtained from the heartwood of a long lived tree may be substantially earlier than the date at which the tree died and was used for firewood. In some long lived tree species this in-built age adjustment can be on the order of 100 years (Dye 2000). For this reason, short lived species are better age indicators. Wood analysis can assist in the identification and red flagging of longer lived plant species, therefore helping to adjust for possible old wood effect.

The results of wood identification on charcoal samples submitted for radiocarbon analysis are presented in Table 12. The full report from International Archaeological Research Inc. is presented in Appendix D.

One taxon was identified in each of the samples totaling two taxa for the assemblage. Neither of the charcoal samples submitted for wood analyses were found to consist of historically introduced species. Both samples were native, short lived species.

Table 10. Wood Identification Results

	WIDL No.	Taxa	Common / Hawaiian Name	Origin/Habit	Part	Count	Weight (g)
Bag 11, T-72, TU 1 Layer I/level 2, Sample #1	1426-1	<i>Chamaesyce</i> sp.	‘Akoko	Native/Shrub	Wood	1	0.07
Bag 28, T-72, TU 1 37 cm bd, west wall post-ex, Sample #3	1426-2	<i>Hibiscus tiliaceus</i>	Hau	Native/Shrub-Tree	Wood	3	0.09

8.4 RADIOCARBON ANALYSIS

Once wood identification had been completed, two charcoal samples were submitted to Beta Analytic Radiocarbon Dating Laboratory for dating. Accelerator mass spectrometry (AMS) radiocarbon dating was used. AMS dating at Beta Analytic includes $^{13}\text{C}/^{12}\text{C}$ analysis, so the

samples were adjusted based on the $^{13}\text{C}/^{12}\text{C}$ ratio. The pretreatment for the AMS dating charred material samples consisted of acid/alkali/acid washes where the sample was first gently crushed and dispersed in deionized water. It was then given hot acid washes to eliminate carbonates, then alkali washes to remove secondary organic acids, then a final acid rinse to neutralize the solution prior to drying. During these serial rinses, mechanical contaminants such as associated sediments and rootlets were removed.

Two charcoal samples collected during the course of the test excavation were submitted for radiocarbon dating. The results of these analyses are summarized in Table 13 and discussed below. The full report from Beta Analytic is presented in Appendix E.

Beta Sample 402614 from 37 cmbd produced three age ranges at 2 sigma (95% probability): AD 1680 – 1765; AD 1800 – 1940; and post 1950. Although two metal artifacts were recovered from Layer I, level 1, no historic artifacts were recovered from the level of the collected sample; it seems reasonable that this sample dates from AD 1680 – 1765.

Beta Sample 402615 also taken from Layer I, level 2 produced five ranges at 2 sigma (95% probability): AD 1665 – 1695, AD 1725 – 1815, AD 1835 – 1840, AD 1855 – 1865, and AD 1920 – post 1950. Again, given that no historic artifacts were recovered from this level of the excavation it seems reasonable that this sample dates from the 100 year period between AD 1655- 1815.

These two radiocarbon dates provide sound information that this site was used during late pre-Contact period between AD 1655 – 1815.

Table 11. Radiocarbon Dating Results

Sample No.	SIHP No. (50-60-04-) & Provenience	Material	Measured Radiocarbon Age	$^{13}\text{C}/^{12}\text{C}$ Ratio	^{13}C Conventional Age B.P.	Calibrated Age ¹ (one sigma)	Calibrated Age ² (two sigma)
Beta 402614	T-072, Charcoal Sample #3, 37 cmbd	Charred Material (cf. <i>Hibiscus tiliaceus</i> ; Hau)	100+/-30 BP	-24.2 o/oo	110 +/-30 BP	Cal AD 1685 to 1730 (Cal BP 265 to 220) Cal AD 1810 to 1895 (Cal BP 140 to 55) Cal AD 1905 to 1925 (Cal BP 45 to 25) Post AD 1950 (Post BP 0)	Cal AD 1680 to 1765 (Cal BP 270 to 185) Cal AD 1800 to 1940 (Cal BP 150 to 10) Post AD 1950 (Post BP 0)
Beta 402615	T-072, Charcoal Sample #1, Layer I, level 2	Charred Material <i>Chamaesyce</i> sp.; 'Akoko)	100.7+/-0.4 pMC	-1034 o/oo	180 +/- 30 BP	Cal AD 1665 to 1685 (Cal BP 285 to 265) Cal AD 1735 to 1785 (Cal BP 215 to 165) Cal AD 1795 to 1805 (Cal BP 155 to 145) Cal AD 1930 to Post 1950 (Cal BP 20 to Post 0)	Cal AD 1655 to 1695 (Cal BP 295 to 255) Cal AD 1725 to 1815 (Cal BP 225 to 135) Cal AD 1835 to 1840 (Cal BP 115 to 110) Cal AD 1855 to 1865 (Cal BP 95 to 85) Cal AD 1920 to Post 1950 (Cal BP 30 to Post 0)

9.0 SIGNIFICANCE ASSESSMENTS

The National Historic Preservation Act of 1966 (as amended) authorizes the Secretary of Interior to expand and maintain a National Register of Historic Places (NRHP) that contains a listing of districts, sites, buildings, structures and objects significant in American history, architecture, archaeology, engineering and culture. A property may be listed in the NRHP if it meets criteria for evaluation defined at 36 CFR §60.4:

- The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and
- A That are associated with events that have made a significant contribution to the broad patterns of our history; or
 - B That are associated with the lives of persons significant in our past; or
 - C That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
 - D That have yielded, or may be likely to yield, information important in prehistory or history.

The State of Hawai‘i recognizes the above criteria under HRS §13-275-6, and has also added a fifth significance criterion to the evaluation process:

- (e) That have an important value to the Native Hawaiian people or to another ethnic group of the State due to associations with cultural practices once carried out or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts – these associations being important to the group’s history and cultural identity.

The sites identified during the current AIS are assessed in Table 14 (below). Of the 55 archaeological sites recorded in the APE, 54 were assessed as significant under Criterion D. These sites are important for their information potential. Each of these sites has either yielded or has the potential to yield information important to state and national history. Forty-five sites have already yielded the information they contain. This information was collected during the current AIS investigations and no further work is being recommended. Thirty-three of these sites (T-007 through T-011, T-014, T-016, T-018, T-019, T-023 through T-027, T-029 through T-033, T-035, T-037, T-038, T-054, T-056, T-057, T-061, T-065 through T-067, T-070, T-071, T-077, and T-078) are recommended to have no further work conducted but are outside of the area of disturbance and will thus not be impacted by construction activities; twelve of these sites (T-001, T-002, T-006, T-015, T-021, T-022, T-028, T-034, T-053, T-055, T-059, and T-073) are

recommended to have no further work conducted and are tentatively scheduled to be destroyed. One site (T-074) contains two features that are recommended to be preserved (Features A and a portion of B) and two features (Features C and D) that require no further work. It is recommended that the entire water aqueduct (Feature A) and approximately half of the adjoining concrete ditch (Feature B) be preserved. The portion of Feature B is being preserved to provide a buffer for Feature A.

The forty-five sites that require no further work are not eligible for listing on either the Hawai'i Register of Historic Places (HRHP) or NRHP. Two additional sites (T-068, and T-072) still have the potential to yield important information of the history of the area and are located in areas of disturbance (see below for a description of each). Data recovery has been recommended for these sites prior to Project construction. Excavations in these sites will provide important information on traditional activities that took place in this area and the chronology of settlement. Once this information has been collected, no additional work will be necessary and these sites will not be eligible for listing. Seven sites (T-003 through T-005, T-017, T-020, T-036, and T-069) are recommended for preservation based on their significance (see below for a description of each). All these sites are outside of the area of disturbance and are eligible for listing on the HRHP.

Thirty-eight of the 55 archaeological sites within the APE have also been assessed as significant under Criterion A. Their significance is based on their association with the Kahuku Plantation (1890-1971), one of the early sugar plantations in Hawai'i and a dominant economic and social force on the North Shore of O'ahu. However, these do not appear to be eligible for listing on either the HRHP or NRHP because there is a lack of integrity (i.e., not enough of the former plantation is present to convey the design, setting, feeling, or association with the former sugar plantation).

Only one site (T-074) appears to be eligible for listing on both HRHP and NRHP because it is assessed as significant under criteria A, C, and D. This site is a concrete aqueduct that spans a natural drainage channel. It is a unique water control feature within the wind farm site.

Table 12. Significance Assessments of Cultural Resources Within the APE

SIHP No.	Field No.	Feature	Type	Site Significance	Recommendation
	T-001	A	Alignment	Not significant	No Further Work
		B	Hearth	Not significant	No Further Work
	T-002	-	Stone Mound	D	No Further Work
	T-003	-	Platform	D	Preservation
	T-004	-	Bunker	A, D	Preservation
	T-005	-	Bunker	A, D	Preservation
	T-006	-	Ditch	A, D	No Further Work
	T-007	-	Terrace	D	No Further Work
	T-008	-	Concrete Culvert	A, D	No Further Work
	T-009	A	Concrete Foundation	A, D	No Further Work
		B	Concrete Foundation	A, D	No Further Work
		C	Concrete Foundation	A, D	No Further Work
		D	Concrete Foundation	A, D	No Further Work
		E	Retaining Wall	A, D	No Further Work

SIHP No.	Field No.	Feature	Type	Site Significance	Recommendation
	T-010	A	Ditch	A, D	No Further Work
		B	Ditch	A, D	No Further Work
		C	Ditch	A, D	No Further Work
		D	Ditch	A, D	No Further Work
	T-011	A	Valve	A, D	No Further Work
		B	Well	A, D	No Further Work
	T-014	A	Concrete Foundation	A, D	No Further Work
		B	Concrete Ditch	A, D	No Further Work
		C	Iron Pipeline	A, D	No Further Work
	T-015	-	Pipeline	A, D	No Further Work
	T-016	-	Soil Ditch	A, D	No Further Work
	T-017	A	Stone Terrace	D	Preservation
		B	Soil Terrace	D	Preservation
	T-018	-	Stone/Concrete Ditch	A, D	No Further Work
	T-019	-	Concrete Ditch	A, D	No Further Work
	T-020	-	Terrace	D	Preservation
	T-021	A	Storage Area	A, D	No Further Work
		B	Concrete Well	A, D	No Further Work
		C	Brick Well	A, D	No Further Work
		D	Brick Well	A, D	No Further Work
		E	Rock/Concrete Wall	A, D	No Further Work
		F	Brick Well	A, D	No Further Work
	T-022	-	Pump House	A, D	No Further Work
	T-023	A	Shed	D	No Further Work
		B	Concrete Slab	D	No Further Work
	T-024	-	Concrete Ditch	A, D	No Further Work
	T-025	-	Stone Ditch	A, D	No Further Work
	T-026	-	Stone Retaining Wall	D	No Further Work
	T-027	-	Soil/Concrete Ditch	A, D	No Further Work
	T-028	A	Soil Ditch	A, D	No Further Work
		B	Concrete Foundation	A, D	No Further Work
	T-029	A	Stone Lined Ditch	A, D	No Further Work
		B	Stone Lined Ditch	A, D	No Further Work
		C	Stone Lined Ditch	A, D	No Further Work
	T-030	A	Soil Ditch	A, D	No Further Work
		B	Retaining Wall	A, D	No Further Work
		C	Retaining Wall	A, D	No Further Work
		D	Concrete Ditch	A, D	No Further Work
	T-031	-	Terraced Soil Furrows	D	No Further Work
	T-032	-	Terrace	D	No Further Work
	T-033	-	Terraced Soil Furrows	D	No Further Work
	T-034	A	Soil Ditch	A, D	No Further Work
		B	Concrete Footing	A, D	No Further Work
	T-035	-	Concrete Ditch	A, D	No Further Work
	T-036	-	Stacked Stone Ditch	A, D	Preservation
	T-037	-	Concrete Ditch	A, D	No Further Work
	T-038	-	Stone Alignment	A, D	No Further Work
	T-053	-	Reservoir	A, D	No Further Work
	T-054	-	Concrete Ditch	A, D	No Further Work
	T-055	-	Concrete Ditch	A, D	No Further Work
	T-056	-	Limestone Ditch	A, D	No Further Work

SIHP No.	Field No.	Feature	Type	Site Significance	Recommendation
	T-057	-	Iron Pipeline	A, D	No Further Work
	T-059	-	Concrete Ditch	A, D	No Further Work
	T-061	A	Pump House	A, D	No Further Work
		B	Tank	A, D	No Further Work
		C	Concrete Ditch	A, D	No Further Work
		D	Concrete Ditch	A, D	No Further Work
	T-065	-	Limestone Ditch	A, D	No Further Work
	T-066	-	Stacked Stone Ditch	A, D	No Further Work
	T-067	-	Modified Outcrop	D	No Further Work
	T-068	-	Stone Terrace	D	Data Recovery
	T-069	A	Terrace	D	Preservation
		B	Terrace	D	Preservation
	T-070	-	Artifact Scatter	D	No Further Work
	T-071	-	Terraced Soil Furrows	D	No Further Work
	T-072	-	Cave	D	Data Recovery
	T-073	-	Concrete Ditch	A, D	No Further Work
	T-074	A	Aqueduct	A, C, D	Preservation
		B	Concrete Ditch	A, C, D	Preservation
		C	Soil Ditch	A, D	No Further Work
		D	Limestone Retaining Wall	A, D	No Further Work
		E	Concrete Ditch	A, D	No Further Work
	T-077	-	Soil Ditch	A, D	No Further Work
	T-078	-	Concrete Ditch	A, D	No Further Work

10.0 DISCUSSION AND RECOMMENDATIONS

Pacific Legacy, Inc., under contract to Nā Pua Makani Wind Partners LLC, conducted an AIS of approximately 464 acres of State and private lands in the *ahupua'a* of Kahuku, Keana, and Mālaekahana on the North Shore of the Island of O'ahu for a proposed wind farm project. The purpose of the AIS is to identify and document archaeological properties and cultural sites within a delineated area, gathering sufficient information to evaluate the significance of identified properties and sites. If significant cultural resources are identified, effect determinations are made and mitigation measures are recommended.

Over the course of field investigations, 72 newly identified archaeological sites comprised of 113 distinct features were documented. Of the 72 sites documented, 22 sites are traditional Hawaiian pre-Contact sites, 40 sites are related to the sugar industry, 7 sites are historic sites not associated with sugar plantation activities, and 3 are military sites.

During the course of field investigations, the APE of the project was altered from ca. 450 acres to 464 acres. This change in size was due to design changes for the wind farm and the desire to avoid several pre-Contact archaeological sites that were identified in lands not strictly needed for development of the wind farm. The intent was to modify the APE so as to protect these sites from project impacts. Seventeen of the 72 identified sites (T-039 to T-044, T-046 to T-052, T-060 and T-062 to T-064) are now located outside of the revised APE and will not be impacted by the proposed Nā Pua Makani Wind Project. Fourteen of the sites outside of the APE, with the exceptions of Sites T-043, T-060, and T-064, appear to be pre-Contact traditional Hawaiian sites. The pre-Contact sites appear to be related to traditional agricultural pursuits (terraces), habitation (cave shelter, overhang shelters, terraces, and walls) and a possible burial (filled crevice). Two of the historic sites outside of the APE (T-060 and T-064) are concrete ditches, while the third site (T-043) is a stone lined drainage, all of which were probably associated with the Kahuku Sugar Plantation. The 17 sites located outside of the current APE had been mapped and described prior to the change in the APE and are thus included in the current AIS report. However, no test excavations were conducted in any of these sites, thus it is difficult to assess the significance of these resources. As a result, no recommendations for significance or preservation have been made. However, if in the future, the current project area expands, or a new project is proposed in the area of these sites, additional archaeological work will need to be conducted on these sites including testing and providing significance and recommendations.

Of the 55 sites located within the APE, eight traditional, likely pre-Contact archaeological sites (T-002, T-003, T-017, T-020, T-067, T-068, T-069, and T-072) were identified. These traditional sites included terraces, a mound, a platform, a shelter cave, and a modified outcrop. These sites should be viewed as vestiges of a traditional landscape that once existed here. It seems rather obvious that the paucity of pre-Contact sites in this area is due to the intensive land altering activities that were conducted by the Kahuku Plantation. These traditional sites provide a glimpse of the very intensive use of the area by Native Hawaiians during the pre-Contact period. The intensive traditional use of the area probably had both permanent habitation sites and temporary shelters, with activities centered on intensive agricultural practices and

exploitation of the adjacent marine resources. Agricultural practices probably revolved around dryland cultivation of traditional crops such as sweet potato, taro, sugar cane, gourd, etc. Marine exploitation included shell fish and seaweed gathering, as well as near-shore and off-shore fishing. The intensive use of the area is supported by early historic explorer accounts describing this portion of O‘ahu.

Four of the traditional sites (T-003, a possible habitation platform; T-017, two probable agricultural terraces; T-020, an agricultural terrace; and T-069, a habitation terrace and an agricultural terrace) inside the APE have been recommended for preservation. One traditional site (T-072, a shelter cave) cannot be avoided by construction activities. Site T-072 is recommended for data recovery excavations, as well as for Site T-068 (a terrace), where the function and age are still in question. Data recovery excavations will add to our knowledge about traditional use of this portion of the North Shore of O‘ahu. No further work is recommended for two of the traditional sites (T-002, a stone mound that was test excavated during the current AIS investigations; and T-067, a modified outcrop that has a low potential to yield any further information).

Thirty-seven of the 55 recorded sites within the APE are associated with the agricultural development and intensive use by the former Kahuku Plantation. The Kahuku Plantation was formed in 1890 and was in operation until 1971. By the mid-1930s, the plantation was cultivating nearly 4,500 acres and employed 1,137 people. The overwhelming majority of sugar plantation related features functioned mainly to control and transport water. A total of 65 features in 36 sites are related to water control and transport. These features include a variety of ditches, metal pipelines, wells, reservoirs, pump houses, and concrete foundations. The ditches are present in several forms, from simple earthen ditches, to stone-lined ditches, to concreted ditches.

The two military defensive bunkers identified on the west side of the APE (Site T-004 and T-005) were associated with World War II and are part of the Coastal Defense System. These sites highlight the limited use of the area by the U.S. Military during the 1940s. Other than the temporary bivouac site (T-001) found on the west side of the APE, no other evidence of military use was found in the APE.

Of the 55 sites located within the APE, 33 sites (T-007 through T-011, T-014, T-016, T-018, T-019, T-023 through T-027, T-029 through T-033, T-035, T-037, T-038, T-054, T-056, T-057, T-061, T-065 through T-067, T-070, T-071, T-077, and T-078) are recommended to have no further work conducted but are outside of the area of disturbance and will thus not be impacted by construction activities. Twelve sites (T-001, T-002, T-006, T-015, T-021, T-022, T-028, T-034, T-053, T-055, T-059, T-073) are recommended for no further work and are tentatively scheduled to be destroyed. Seven sites are recommended to be preserved (T-003 through T-005, T-017, T-020, T-036, and T-069) based upon their significance. Data recovery excavations are recommended on the two sites discussed above (T-068 and T-072). Finally, one site (T-074) associated with the Kahuku Plantation contains two features that are recommended to be preserved (Features A and a portion of B), and two features (Features C and D) that require no further work and may be destroyed. It is recommended that the entire water aqueduct (Feature A) and approximately

half of the adjoining concrete ditch (Feature B) be preserved. The portion of Feature B is being preserved to provide a buffer for Feature A.

It is recommended that data recovery occur at Site T-072, a habitation cave. The site is located within the vicinity of the proposed Turbine 10 and the laydown/building area and cannot be avoided. Marine shell midden is present throughout the surface of the cave floor and a shark tooth was also found on the floor of the cave. A test excavation placed within the cave identified additional abundant marine shell and non-human bone midden along with four basalt flakes and two historic household artifacts. The radiocarbon dates from the site indicate an occupation of between ca. AD 1650-1815 for the site. The presence of the marine midden and traditional artifacts supports this date range while the miniature picture frame and metal button post suggests use of the site into the early post-Contact period.

Given the number of resources identified during the AIS and the potential to uncover additional subsurface sites during construction, archaeological monitoring is recommended during all ground disturbing activities within the project area.

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Yent, Martha and Jason Ota

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1983 *Eroding Archaeological Site at Mālaekahana Phase III, Mālaekahana Bay, Windward O‘ahu*. State of Hawai‘i, Department of Land and Natural Resources, Division of State Parks.

Map

United States Department of Interior (USDI)

1938 *Transportation on Oahu*.

APPENDIX A

SHPD AISP Acceptance Letter



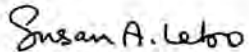
Dr. Paul Cleghorn
August 5, 2014
Page 2

The trench excavation methods will involve, where possible, identification and mapping in plan view and hand excavation of cultural layers, midden remains, artifacts, and pit features. Artifact assemblages present in fill deposits and large historic trash-filled pits will be subjected to field documentation (photographs of representative samples and qualitative and quantitative analysis) with collection of only a representative sample of artifacts for more detailed analysis in the laboratory. Traditional Hawaiian artifacts, faunal shell and bone, and charcoal and other botanical remains will be collected (or sampled, as appropriate) for analysis in the laboratory. Should samples of charcoal be recovered from secure proveniences at tested sites, the samples will be first submitted to International Archaeological Research Institute, Inc. for wood identified analysis, including determining the presence/absence of historically-introduced wood and differentiating between short lived and long lived species. Selected samples will be then sent for radiocarbon analysis.

The archaeological inventory survey plan is accepted, pursuant to Hawai'i Administrative Rule 13§13-284-5(c). Please send one hardcopy of the document, clearly marked FINAL, along with a copy of this review letter and a text-searchable PDF version on CD to the Kapolei SHPD office, attention SHPD Library.

Please call Deona Naboa at (808) 692-8015 if you have any questions or concerns regarding this letter.

Aloha,



Susan A. Lebo, PhD
Oahu Lead Archaeologist

APPENDIX B

Site Descriptions

SIHP No.:

Field No.: T-001

Site Type: Complex

Site Function: Bivouac

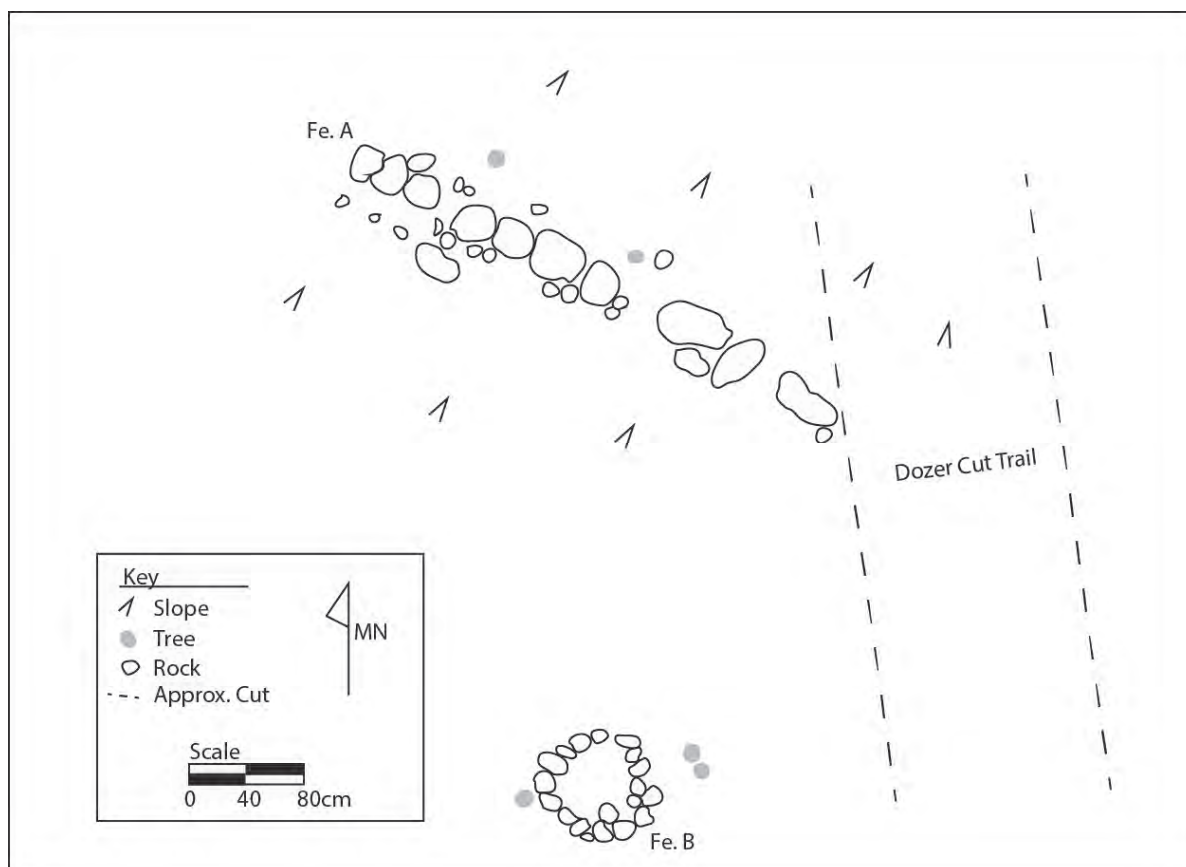
Site Condition: Good

Description: Site T-001 is situated within a small saddle on the north slope of an unnamed ridge. The edges of the saddle to the east and west are slightly higher than the saddle itself. The east slope descends into an unnamed gulch and the west slope descends into 'Ohia'ai Gulch. A recent bull dozer cut trail is located immediately to the east of the site and appears to have possibly impacted the east edge of Feature A.

Feature A consists of a stone alignment constructed of small to large basalt cobbles. The alignment is oriented northwest to southeast (299° - 119°) and measures approximately 3.8 meters in length by 0.5 meters in width. Several of the cobbles are slightly embedded into the ground.

Feature B consists of a circular stone hearth located ca. 3.5 meters up slope to the south of Feature A. The hearth is constructed of small to medium basalt cobbles and measures ca. 0.9 meter in length (east-west) by 0.8 meter in width (north-south).

Site T-001 appears to have functioned as a historic military era training campsite or bivouac.



Planview map of Site T-001.



Site T-001, Fe. A, stone alignment, view to southwest.



Site T-001, Fe. B, stone hearth, view to southeast.

SIHP No.:

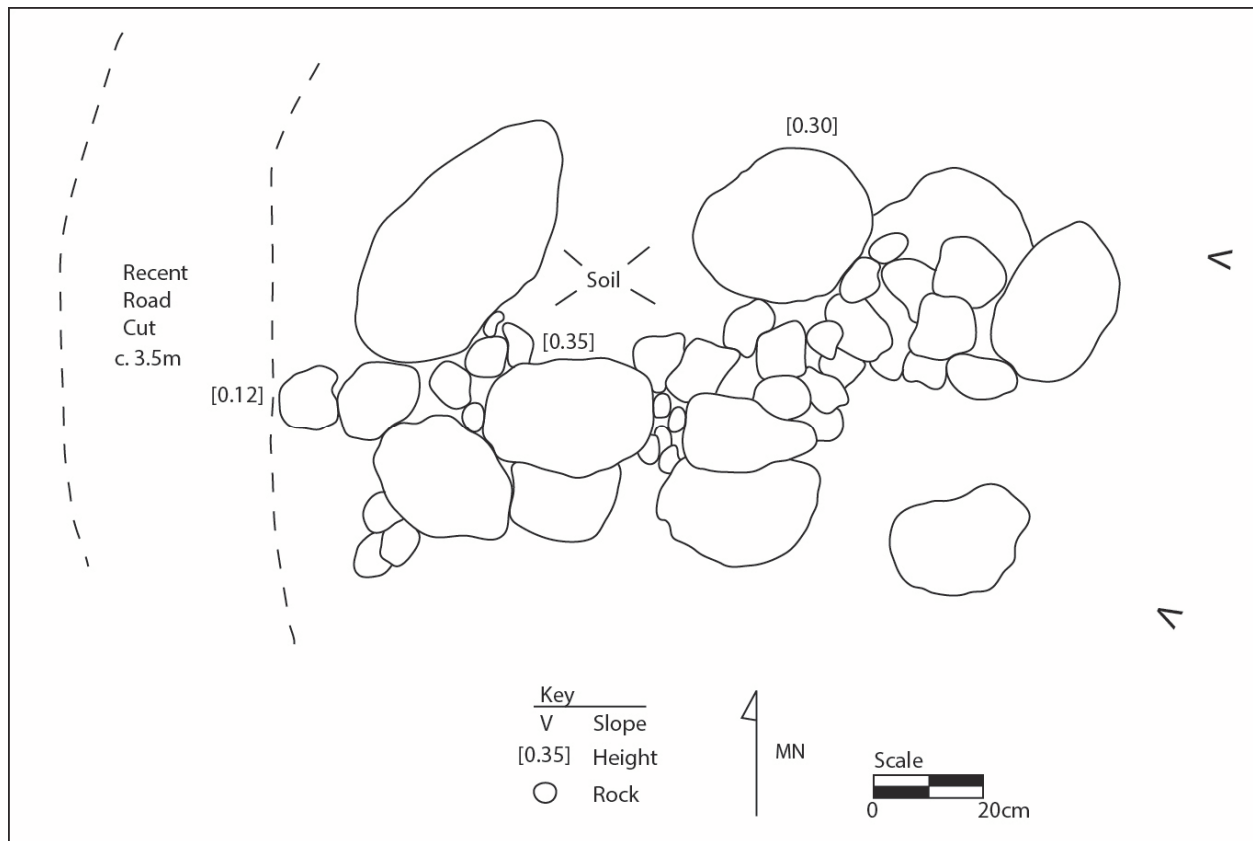
Field No.: T-002

Site Type: Stone Mound

Site Function: Marker

Site Condition: Good

Description: Site T-002 is situated on the crest of a ridge located approximately 177 meters south (188°) of Site T-001. Site T-002 consists of a roughly rectangular stone mound constructed of small basalt boulders and large basalt cobbles. The mound measures ca. 1.7 meters in length (east-west) by 0.9 meters in width (north-south) by 0.35 meter in height above the surrounding ground surface. Originally, the stone mound was thought to possibly represent a human burial mound. In order to verify this assumption, a 1.0 meter by 1.0 meter test unit was excavated at this feature. Excavation of Test Unit 1 did not encounter any cultural material or human skeletal remains. Therefore, the function of the stone mound was revised to a traditional marker. The results of the excavation are presented in Section 7.0 of this report.



Planview map of Site T-002.



Site T-002, stone mound, view to southeast.

SIHP No.:

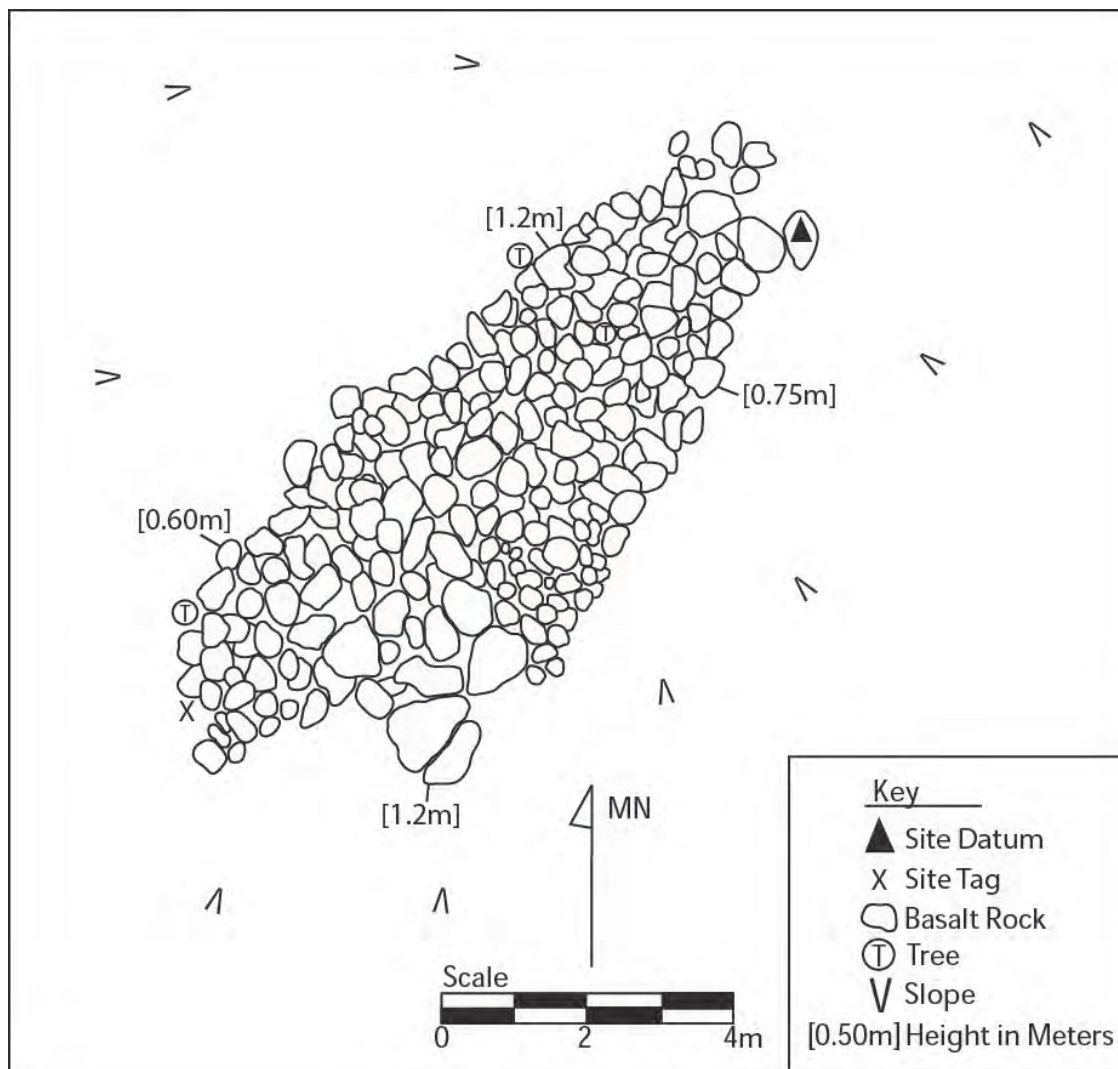
Field No.: T-003

Site Type: Platform

Site Function: Habitation

Site Condition: Excellent

Description: Site T-003 consists of a stone platform located approximately 231 meters northeast from Site T-006. It is situated near the beginning of a drainage that descends to the northeast. Vegetation in the area consists of Christmasberry, strawberry guava, and a variety of ground cover. A small cluster of *ti* plants is located immediately upslope of the platform. The platform is roughly rectangular in shape and is constructed of medium to large basalt boulders which have been loosely stacked and piled between two to three courses of stone in height. The surface of the platform is relatively level, but not paved. The platform measures ca. 11.5 meters in length by 5.4 meters in width at the southwest end and 2.8 meters in width at the northeast end. The platform ranges between ca. 0.6 to 1.5 meters in height above the surrounding ground surface. The platform appears to have functioned as a traditional habitation site.



Planview map of Site T-003.



Site T-003, platform, view to southwest.

SIHP No.:

Field No.: T-004

Site Type: Concrete Bunker

Site Function: Observation

Site Condition: Good

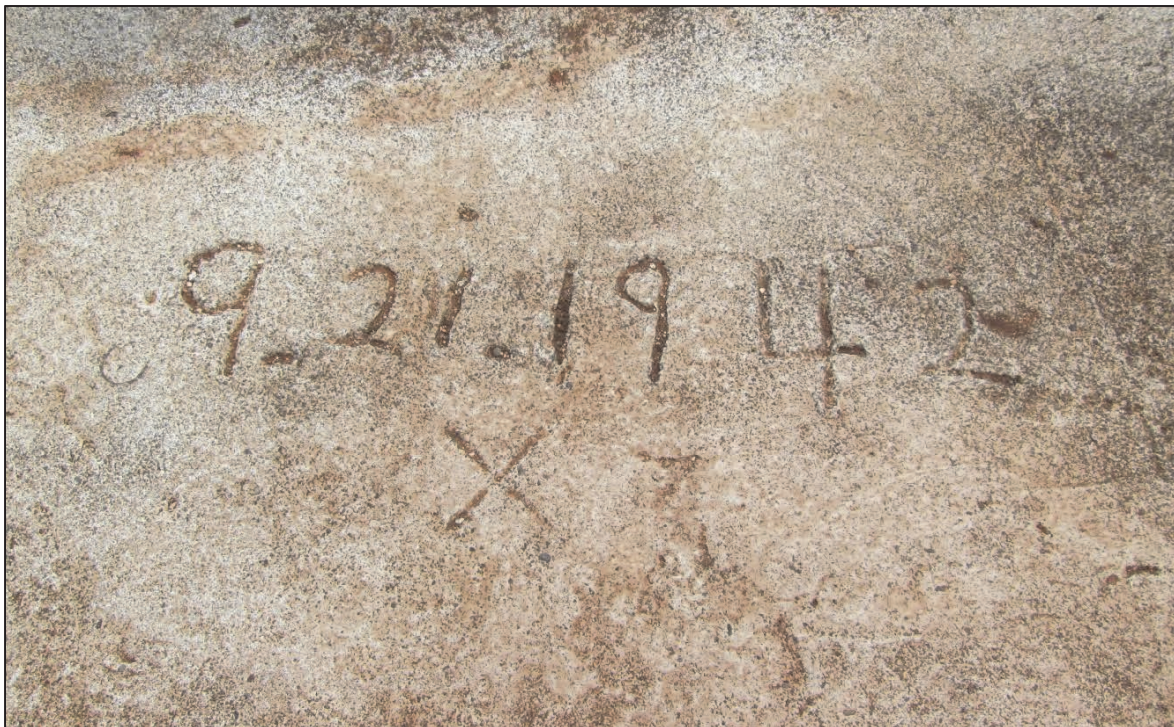
Description: Site T-004 consists of a concrete bunker located on top of a relatively flat ridge near the permanent project related MET-Tower. The bunker is square in shape and is oriented roughly north to south (5°-185°). It has a flat roof, and there is an opening located on the southeast side with a staircase that descends into the structure. The large interior room measures ca. 6.1 meters in length (north-south) by 6.1 meters in width (east-west) by 2.1 meters in height. There are three large openings to the north, east, and west that provide ample views of the coastline. These windows measure ca. 0.4 meter in height. In the center of the main room is a raised concrete foundation with three metal bolts. A smaller room is located to the southwest of the main room and measures ca. 2.60 meters in length (north-south) by 2.10 meters in width (east-west). The exterior of the bunker only measures ca. 1.4 meters in height above the surrounding ground surface due to the partial subsurface nature of the structure. A wooden pole measuring ca. 4.5 meters in height is located at the northeast corner of the structure and was likely used to run telephone and electric wires to the bunker. There are metal frames on the exterior of the viewing windows which likely held some sort of covering. A "9.21.1942" construction date is inscribed on the exterior of the roof. Overall, the site is in good condition. Modern spray paint graffiti is visible on the exterior and interior of the bunker. The bunker appears to have functioned as part of the WWII coastal defense system.



Site T-004, exterior of bunker with MET-Tower in background, view to southwest.



Site T-004, interior, view to northeast.



Site T-004, inscribed date (9.21.1942) on exterior roof, view to southeast.

SIHP No.:

Field No.: T-005

Site Type: Concrete Bunker

Site Function: Firing Position

Site Condition: Fair

Description: Site T-005 consists of a concrete bunker located on the edge of a ridge overlooking Kahuku, situated ca. 75.0 meters east of Site T-004. The bunker is partially embedded into the hillside, with the exposed exterior portion measuring ca. 4.4 meters in length (northwest-southeast) by 4.4 in width (northeast-southwest) by 0.75 meters in maximum height above the surrounding ground surface. An entrance to the bunker is located on the south side and consists of a soil ramp with three to four courses of stacked stone with mortar. The entrance is partially filled with soil, but measures ca. 1.2 meters in height by 0.8 meters in width. The interior of the bunker consists of a small room that measures ca. 3.0 meters in length (east-west) by 2.6 meters in width (north-south) by 1.75 meters in height. The interior floor is covered in soil and trash. The northeastern side of the interior room has a rounded extension with a small opening. The extension measures ca. 1.7 meters in length by 1.5 meters in width. The viewing window measures ca. 0.4 meters in height. There are three ventilation holes visible on the roof. Overall, the site is in fair condition. Modern spray paint graffiti is visible on the exterior and interior of the bunker. The bunker appears to have functioned as part of the WWII coastal defense system.



Site T-005, exterior of bunker, view to west.



Site T-005, interior, view to northeast.



Site T-005, interior, view to south.

SIHP No.:

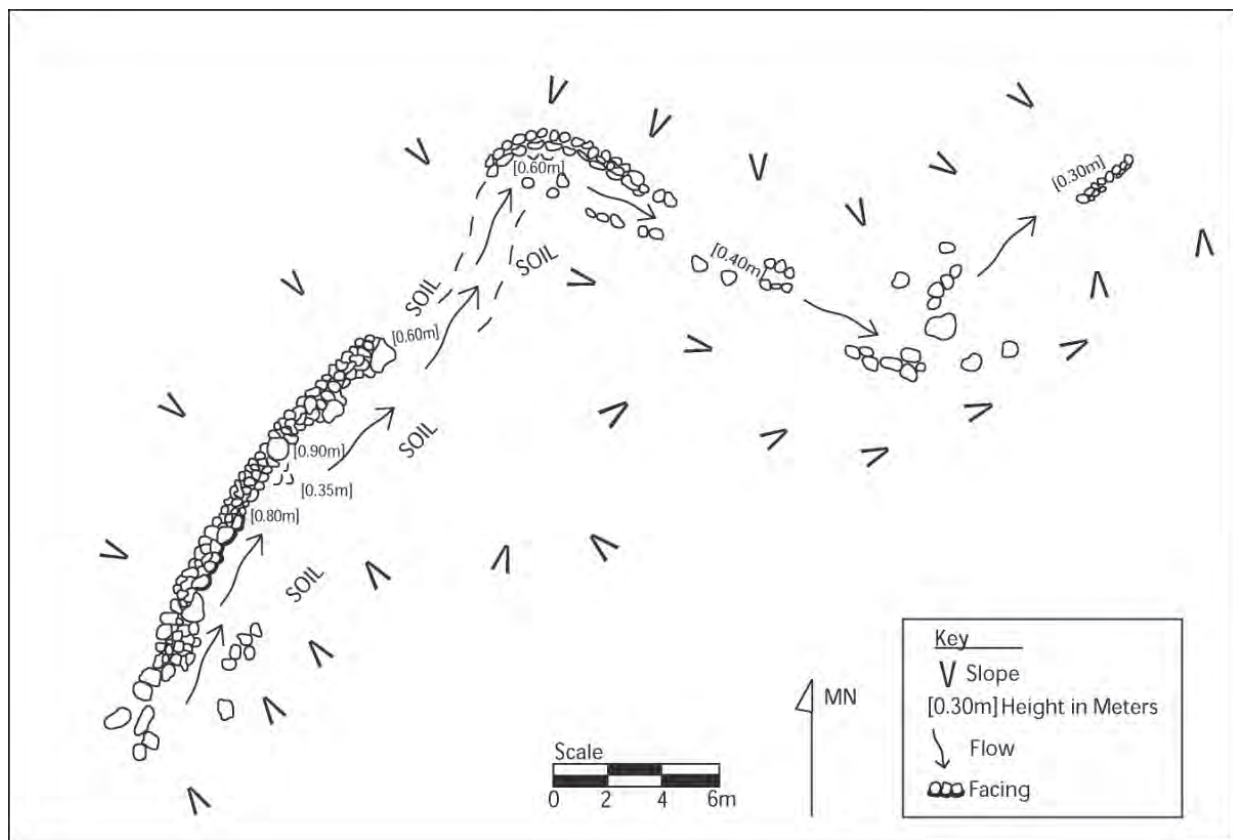
Field No.: T-006

Site Type: Ditch

Site Function: Water Transport

Site Condition: Fair

Description: Site T-006 consists of a stone and soil ditch located approximately 300 meters down slope to the northeast of Site T-003. The site is situated along the northwest edge of a northeast running drainage. The ditch is constructed of loosely stacked and partially faced small to large basalt cobbles and boulders along the northwest side and a soil ditch and berm along the southeast side. The ditch runs approximately 16.8 meters down slope to the northeast (60°), then bends and runs 10.0 meters to the southeast (120°), then bends again and runs 12.0 meters to the northeast (50°). The stone portion of the ditch measures between 0.7-1.1 meters in height along the southeast side and up to 0.4 meter in height along the northwest side. In places, one boulder is used, in other places cobbles are stacked four to five courses in height. The ditch measures ca. 2.0 meters in width and up to 0.5 meter in depth. Overall, the ditch is in fair condition. Site T-006 appears to have functioned as a ditch constructed in order to transport water for the former commercial sugar plantation.



Planview map of Site T-006.



Site T-006, stacked stone portion of ditch, view to north.

SIHP No.:

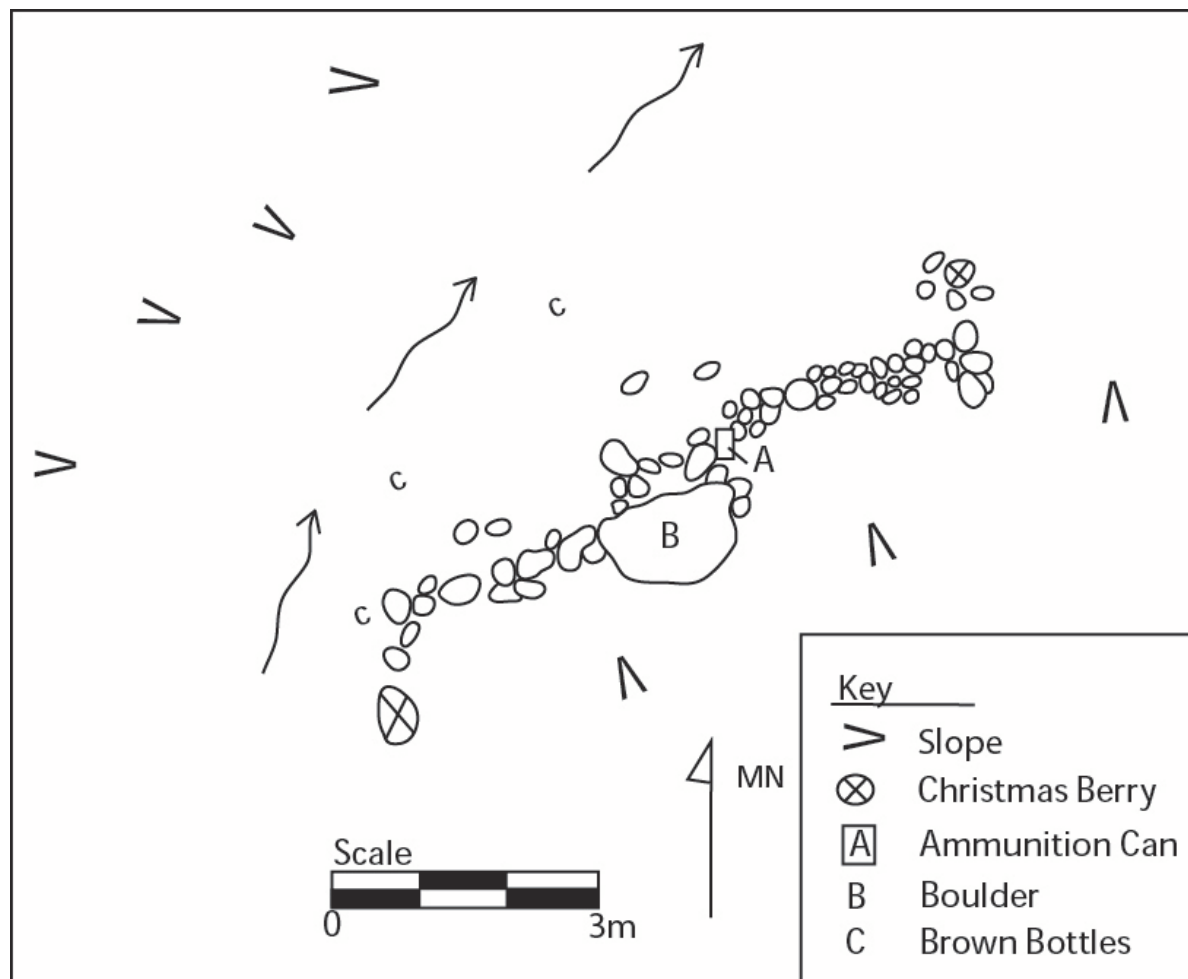
Field No.: T-007

Site Type: Terrace

Site Function: Agriculture

Site Condition: Fair

Description: Site T-007 consists of a terrace located within the same drainage as Site T-003 and T-006. It is approximately 150.0 meters northeast of Site T-003 and 150.0 meters southwest of Site T-006. The terrace is situated along the southeast side of the northeast running drainage and consists of a roughly L-shaped stone retaining wall constructed of piled small basalt boulders and small to large cobbles along the west and north edges of the feature. The surface of the terrace is roughly paved with basalt cobbles except for a large basalt boulder located in the center. The terrace measures ca. 7.0 meters in length by 1.5 meters in width by 0.35 meters in height above the surrounding ground surface. Several historic artifacts were observed at Site T-007 including three glass beer bottles and one metal ammunition can. Overall, Site T-007 is in fair condition, although the terrace does appear to have been impacted by water flow within the drainage and vegetation growth. Site T-007 appears to have functioned as an agricultural terrace constructed and utilized during the historic period.



Planview map of Site T-007.



Site T-007, terrace, view to southeast.

SIHP No.:

Field No.: T-008

Site Type: Concrete Culvert

Site Function: Water Control

Site Condition: Fair

Description: Site T-008 is of a concrete culvert consisting of a corrugated metal pipe, concrete wall, and basalt cobble retaining wall. The concrete wall measures ca. 2.44 meters in length by 0.3 meter in thickness by 1.6 meters in height above the surrounding ground surface. A corrugated metal pipe measuring ca. 3.0 meters in length by 0.9 meter in diameter extends through the lower portion of the concrete wall. The pipe extends ca. 0.9 meters from the edge of the concrete wall. Loosely stacked large basalt cobbles form a retaining wall that supports the concrete wall and holds the corrugated pipe in place. There is an orange plastic survey marker with "1061" written on it in Sharpie located next to the culvert. Site T-008 appears to have functioned as a culvert constructed and utilized during the former commercial sugar plantation in order to divert water into a natural drainage.



Site T-008, concrete culvert, view to north.

SIHP No.:

Field No.: T-009

Site Type: Complex

Site Function: Water Control

Site Condition: Poor

Description: Site T-009 is complex consisting of a series of four concrete block foundations and a short section of a concrete retaining wall situated along a small dry streambed. The site is located on DLNR land, approximately 60.0 meters northeast from the property boundary.

Feature A consists of an irregularly shaped concrete block foundation measuring 1.50 meters in length by 1.0 meter in width by 1.3 meters in height above ground surface. There is a thin layer of black tar on a portion of the foundation. This feature is situated less than 1.0 meter north of the streambed.

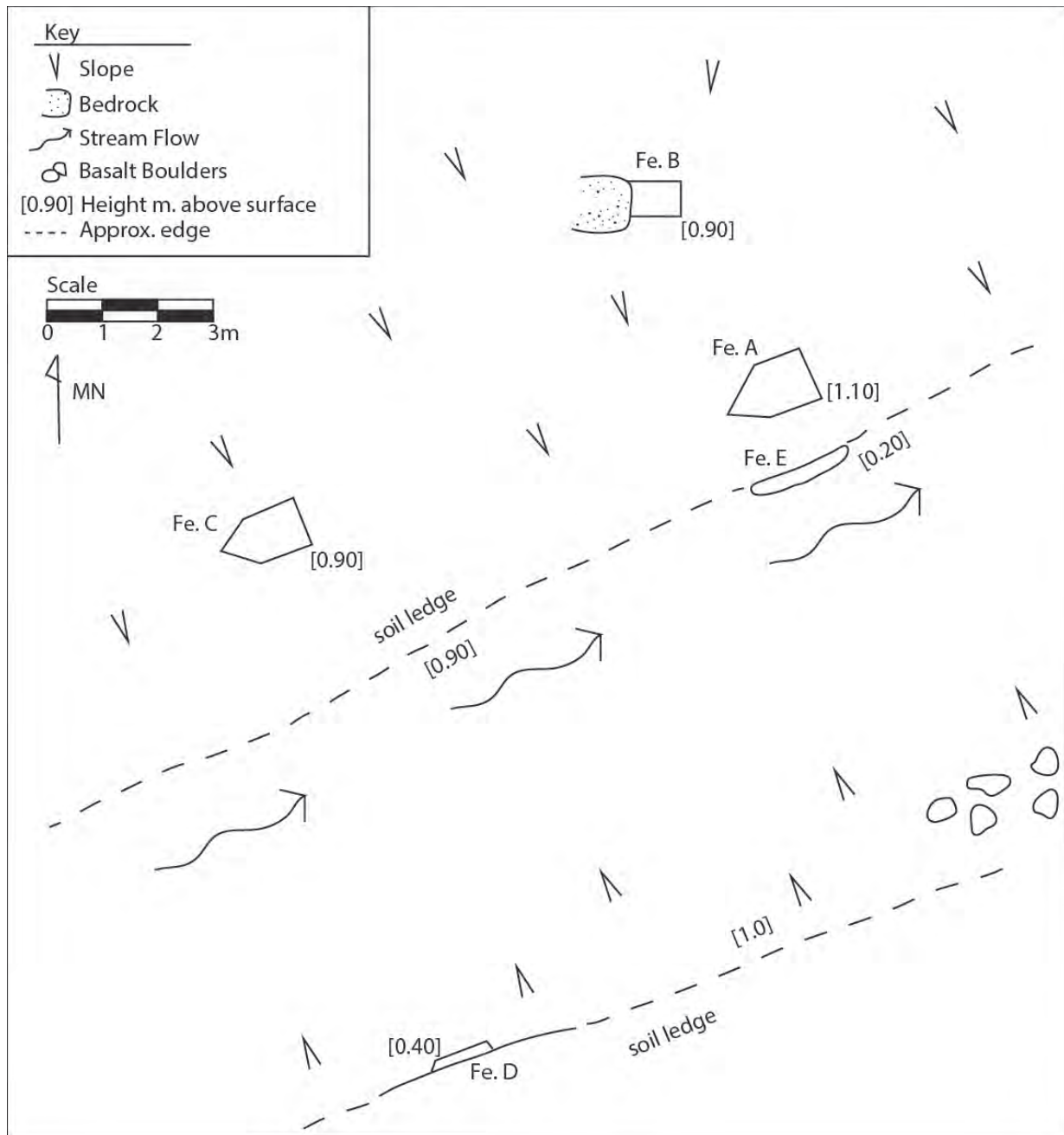
Feature B is another irregularly shaped concrete foundation located ca. 3.0 meters upslope to the northeast of Feature A. Feature B measures 0.95 meter in length by 0.76 meter in width by 1.06 meters in height. Basalt cobbles have been mortared together to form a concrete foundation that is connected to a basalt outcrop.

Feature C is an irregularly shaped concrete foundation located ca. 7.0 meters southwest of Feature A. It measures 1.5 meters in length by 1.15 meters in width by 0.9 meter in height. Like Feature A and Feature B, it is located on the north side of the streambed. It also has black tar staining on the top.

Feature D consists of a partially buried concrete foundation located ca. 6.0 meters southeast of Feature C, on the south side of the streambed. It measures ca. 1.4 meters in length by 0.35 meter in width by 0.4 meter in height above the ground surface. The exposed portion of the foundation is similar in size and construction to the other features. The soil burying Feature D was presumably pushed over from the dirt road-cut above Feature D to the south.

Feature E consists of a partially buried concrete retaining wall located ca. 0.9 meter south of Feature A. The wall is constructed of basalt cobbles and concrete, and measures 1.8 meters in length by 0.2 meter in width by 0.2 meter in height above the ground surface. It is situated within the streambed and was likely used to protect Feature A from flowing stream water.

Given its location in a narrow gulch, off a dirt road, and situated on both sides of a dry streambed, Site T-009 appears to be associated with water control related to the former commercial sugar plantation.



Planview map of Site T-009.



Site T-009, Fe. A, concrete foundation, view to northeast.



Site T-009, Fe. C, concrete foundation, view to northeast.

SIHP No.:

Field No.: T-010

Site Type: Complex

Site Function: Water Transport

Site Condition: Good

Description: Site T-010 is a complex consisting of four connecting ditches situated along the edge of a drainage.

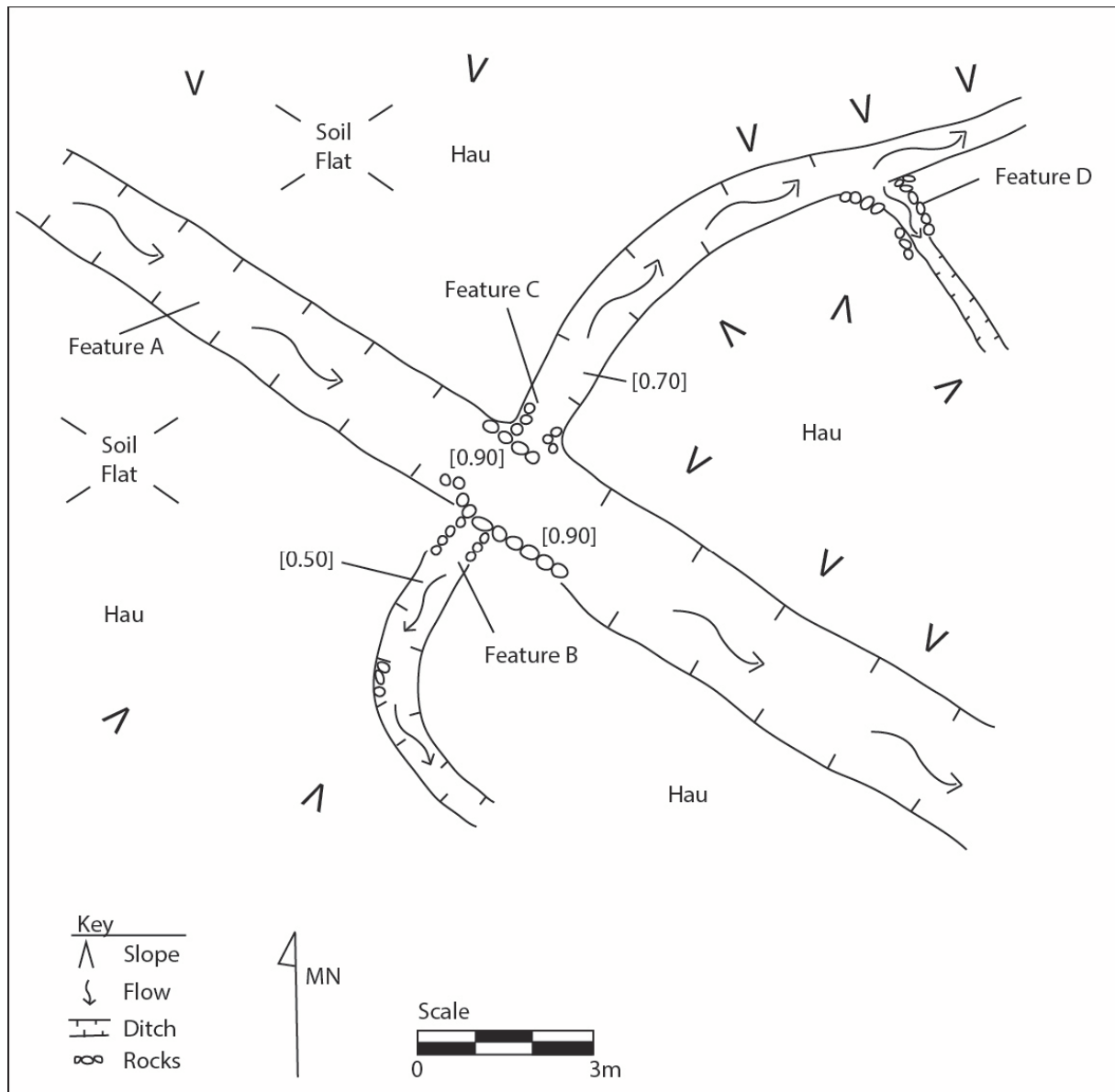
Feature A is a large ditch which runs northwest to southeast down the center of the site. The majority of the ditch consists of soil with portions of stacked basalt boulder and cobble retaining walls located at the intersections with Feature B and Feature C. The ditch measures ca. 40.0 meters in length by 3.3 meters in width with a maximum depth of 2.2 meters. The bottom of the ditch is relatively flat and the sides are relatively steep. The stone retaining wall located at the intersection with Feature B measures ca. 2.3 meters in length by 0.9 meter in height. The stone retaining wall located at the intersection with Feature C measures ca. 1.2 meters in length by 0.9 meter in height.

Feature B is a smaller, shallower ditch extending off from Feature A, located directly across from Feature C. It runs southwest from the intersection with Feature A for ca. 3.0 meters before turning to the southeast. The majority of the ditch consists of soil with short segments partially lined with basalt cobbles. The ditch measures ca. 20.0 meters in length by 0.7 meter in width by 0.5 meters in depth.

Feature C is also a smaller, shallower ditch extending off from Feature A, located directly across from Feature B. It runs northeast from the intersection with Feature A for ca. 5.0 meters before turning to the east. The majority of the ditch consists of soil with short segments partially lined with basalt cobbles. It measures ca. 20.0 meters in length by 1.0 meter in width by 0.7 meter in depth.

Feature D is a small ditch extending off from Feature C, located ca. 7.6 meters northeast of the intersection with Feature A. It runs southeast from the intersection with Feature C and measures ca. 3.5 meters in length by 0.3 meter in width by 0.3 meter in depth. The majority of the ditch consists of soil with a short segment located at the intersection with Feature C lined with basalt boulders and cobbles and a short piece of a preformed concrete ditch. The concrete ditch measures ca. 0.7 meter in length by 0.3 meter in width by 0.3 meter in depth.

Site T-010 is in good condition. The site appears to be associated with water transport related to the former commercial sugar plantation.



Planview map of Site T-010.



Site T-010, Fe. D, view to southeast.



Site T-010, Fe. A, view to northeast.

SIHP No.:

Field No.: T-011

Site Type: Complex

Site Function: Water Control

Site Condition: Poor

Description: Site T-011 is a complex comprised of a valve (Feature A) and a well (Feature B). The site is situated on a gradual northwest facing slope that forms a reservoir that appears to be manmade. The site measures 14.2 meters in length (northwest-southeast) by 0.75 meter in width (northeast-southwest) by 0.3 meter in depth and 0.3 meter in height above ground surface. Feature A is located ca. 13.0 meters upslope of Feature B. Feature A consists of a valve constructed of iron and steel with an iron wheel at the top of the feature that turns an inner cog and controls the opening of the well (Feature B). Feature B is a subsurface well measuring ca. 0.6 meter in width by 0.3 meter in depth. The well is filled in with soil and debris, but still contains water. A metal cover partially blocks the well and resembles a man-hole cover. The features are adjoined by pipes and function as a pulley system to expose and/or cover the opening of the well. The pipes are set on concrete footings with straps. Site T-011 appears to be associated with water control related to the former commercial sugar plantation.



Site T-011, Fe. A, valve, view to northwest.



Site T-011, Fe. B, well, view to southeast.

SIHP No.:

Field No.: T-014

Site Type: Complex

Site Function: Water Transport

Site Condition: Poor

Description: Site T-014 is a complex consisting of three associated features located on the north side of a natural drainage.

Feature A is a concrete foundation located ca. 2.0 meters to the west of Feature B. The foundation measures ca. 3.3 meters in length (east-west) by 3.2 meters in width (north-south) by at least 0.68 meter in depth. Rusted metal is visible along the interior of the foundation which is covered with soil and vegetation. Therefore, no interior depth could be obtained. The rusted metal may indicate there was a cover for the foundation. The concrete foundation may have been used for water control considering its proximity to the other features.

Feature B is a concrete ditch located ca. 2.0 meters to the east of Feature A. The ditch is oriented roughly northwest-southeast extending down slope, and is made up of preformed concrete sections that are broken into various segments. Overall, it measures ca. 15.8 meters in length by 0.28 meter in width by 0.17 meter in depth. The ditch appears to have transport water down slope.

Feature C is a large iron pipeline located ca. 2.4 meters north of Feature B and oriented roughly northwest-southeast. Overall, it measures ca. 53.0 meters in length, but only 30.0 meters is within the current APE. The remaining 23.0 meters is located outside the APE. The pipeline measures ca. 0.61 meter in diameter (2 feet), and appears to have transported water down slope.

Site T-014 appears to be associated with water transport related to the former commercial sugar plantation.



Site T-014, Fe. A, concrete foundation, view to west.



Site T-014, Fe. A concrete foundation (on left) and Fe. C. pipeline (on right), view to northwest.



Site T-014, Fe. C, pipeline, view to northeast.



Site T-014, Fe. B, concrete ditch, view to southeast.

SIHP No.:

Field No.: T-015

Site Type: Pipeline

Site Function: Water Transport

Site Condition: Fair

Description: Site T-015 consists of a steel pipeline oriented roughly northwest-southeast along the toe of a slope. The pipeline measures approximately 174.3 meters in length by 0.61 meters (24 inches) in diameter. The south end of the pipeline terminates into the ground, while the north end simply ends. The pipeline segments appear to be riveted together, and a concrete or asbestos like white lining is visible on the interior of the pipe. The south end of the pipeline that terminates into the ground contains a wheel valve with a concrete and stone ditch extending down slope to the east for ca. 10.0 meters. The concrete and stone ditch measures ca. 1.0 meter in width by 0.2 to 0.3 meter in depth. Additional concrete ditch segments are loosely scattered on the surface near the north end of the pipeline. Site T-015 appears to be associated with water transport related to the former commercial sugar plantation.



Site T-015, pipeline, view to southwest.

SIHP No.:

Field No.: T-016

Site Type: Soil Ditch

Site Function: Water Transport

Site Condition: Fair

Description: Site T-016 consists of a soil ditch located approximately 187.0 meters southwest of Site T-015. The ditch is situated on a gradual east facing slope, and is oriented roughly north to south. It measures ca. 68.0 meters in total length and ranges from 1.1 to 1.75 meters in width by 0.5 to 0.75 meter in depth. A filled-in area measuring ca. 9.0 meters in length is located ca. 23.0 meters north of the southern end of the ditch. Site T-016 appears to be associated with water transport related to the former commercial sugar plantation.



Site T-016, soil ditch, view to south.

SIHP No.:

Field No.: T-017

Site Type: Complex

Site Function: Agriculture

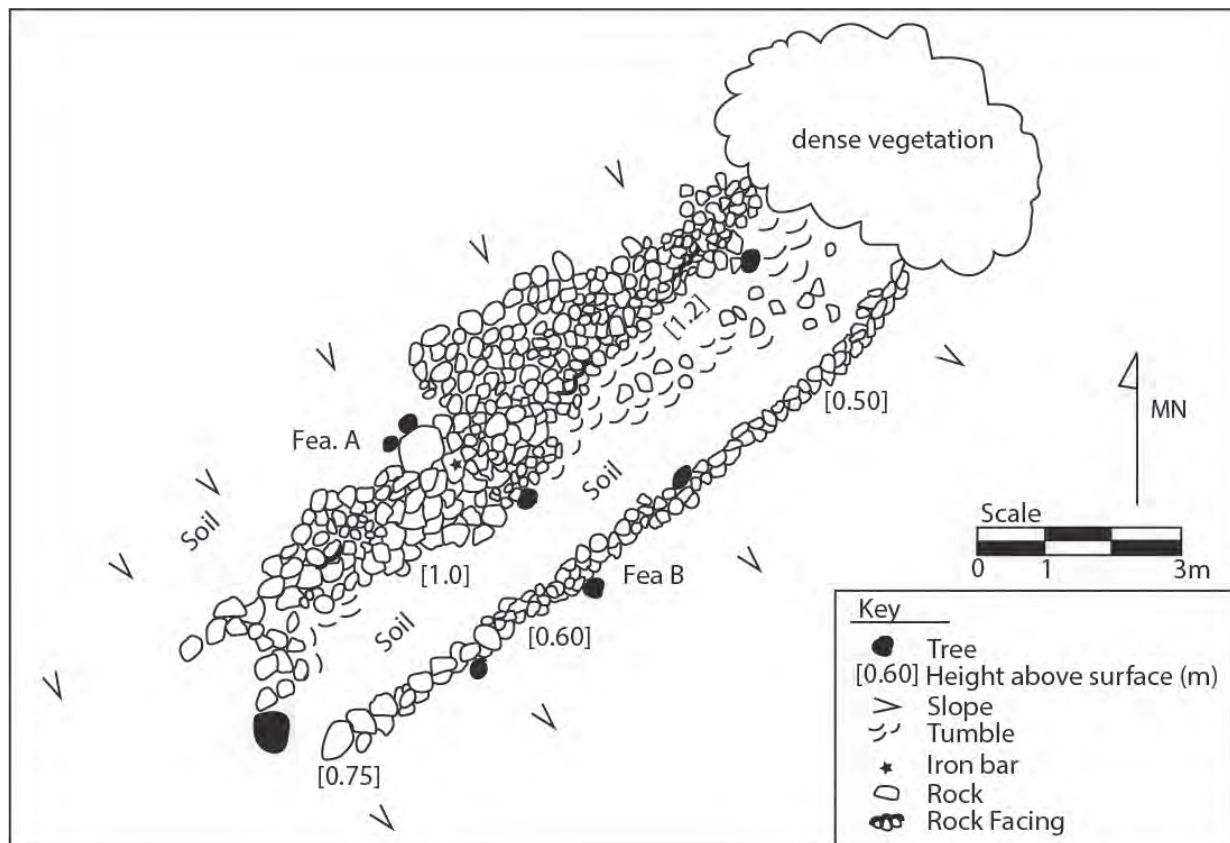
Site Condition: Fair

Description: Site T-017 is a complex comprised of a stone terrace (Feature A) and a soil terrace (Feature B) located ca. 173.0 meters southwest of Site T-016. The site is situated on a southeast facing slope and overall measures ca. 12.5 meters in length by 4.2 meters in width by 1.2 meters in maximum height.

Feature A consists of an irregularly shaped stone terrace located immediately upslope to the northwest of Feature B. The terrace is constructed of loosely stacked small to medium subangular basalt boulders and cobbles between two to four courses of stone in height along the southeast side. The interior surface of the terrace consists of a relatively flat subangular basalt boulder and cobble fill that has been severely jumbled by tree growth. A large rounded basalt boulder sits atop the southwest portion of the terrace. Feature A measures ca. 11.0 meters in length (northeast-southwest) by ca. 2.0-3.0 meters in width (northwest-southeast). The maximum height of Feature A is ca. 1.2 meters along the southeast side and 0.5 meter along the northwest side. The terrace is in fair condition. Tumbling has occurred along the southeast side and the surface stone fill has been jumbled by tree growth. A historic iron bar and metal wire were observed on the surface of Feature A. The bar measures ca. 2.2 meters in length by 0.03 meter in width by 0.02 meter in thickness. The metal wire is bent and measures 0.4 meter in length by 0.01 meter in diameter.

Feature B consists of a soil terrace with stone retaining wall located immediately down slope to the southeast of Feature A. The stone retaining wall is oriented roughly northeast to southwest and supports the soil terrace to the northwest. The retaining wall is constructed of small to medium subangular basalt boulders that have been loosely stacked up to two courses of stone in height. The interior surface of the terrace consists of a relatively flat area of soil. Feature B measures ca. 12.5 meters in length (northeast-southwest) by 1.0-2.0 meters in width (northwest-southeast). The maximum height of the retaining wall is ca. 0.75 meter along the southeast side. The terrace is in good condition, with minimal tumbling of the retaining wall and limited tree growth in the soil fill. No cultural material was observed at Feature B.

Site T-017 appears to have functioned as a traditional agricultural complex comprised of a stone terrace and an adjoining soil terrace. The site may have been modified and/or utilized into the historic period.



Planview map of Site T-017.



Site T-017, Fe. A, terrace, view to west.



Site T-017, Fe. B, terrace, view to northwest.

SIHP No.:

Field No.: T-018

Site Type: Stone/Concrete Ditch

Site Function: Water Transport

Site Condition: Fair

Description: Site T-018 consists of a stone and concrete ditch located ca. 125.0 meters west of Site T-016. It is oriented roughly east to west, and runs across a south facing slope. The linear ditch is split into two separate segments by a gap measuring ca. 20.0 meters in length. The western segment of the ditch is constructed of loosely stacked small basalt boulders and small to medium basalt cobbles between three to five courses of stone in height. The stones have been secured in place with concrete mortar. The western segment measures ca. 12.7 meters in length by 1.0 meter in width by 0.70 meter in height. The eastern segment is also constructed of loosely stacked small basalt boulders and small to medium basalt cobbles between three to five courses of stone in height. The stones have been secured in place with concrete mortar, except at the eastern end, where no concrete mortar was used in the construction of the ditch. The eastern segment measures ca. 11.3 meters in length by 1.0 meter in width by 0.70 meter in height.

Overall, the ditch is in fair condition. Some portions of the ditch have tumbled. Several modern plastic planting pots were observed within the ditch. Site T-018 appears to be associated with water transport related to the former commercial sugar plantation.



Site T-018, stone/concrete ditch, view to west.



Site T-018, stone/concrete portion of ditch, view to northeast.



Site T-018, stacked stone portion of ditch, view to north.

SIHP No.:

Field No.: T-019

Site Type: Concrete Ditch

Site Function: Water Transport

Site Condition: Fair

Description: Site T-019 consists of a concrete ditch oriented roughly northwest to southeast and measuring ca. 27.0 meters in length by 0.48 meter in width and 0.2 meter in height. The ditch is constructed of preformed concrete segments each measuring ca. 0.9 meter in length. The southeastern end of the ditch has been bulldozed and broken apart. The north end of the ditch has a Y-shaped intersection. A short concrete section running down slope to the east from the main ditch measures ca. 0.80 meter in length and flows into a soil ditch. This short section of ditch has a sliding metal door with handle at the Y-shaped intersection to control water flow down slope. Site T-019 appears to be associated with water transport related to the former commercial sugar plantation.



Site T-019, concrete ditch, Y-shaped intersection, view to south.

SIHP No.:

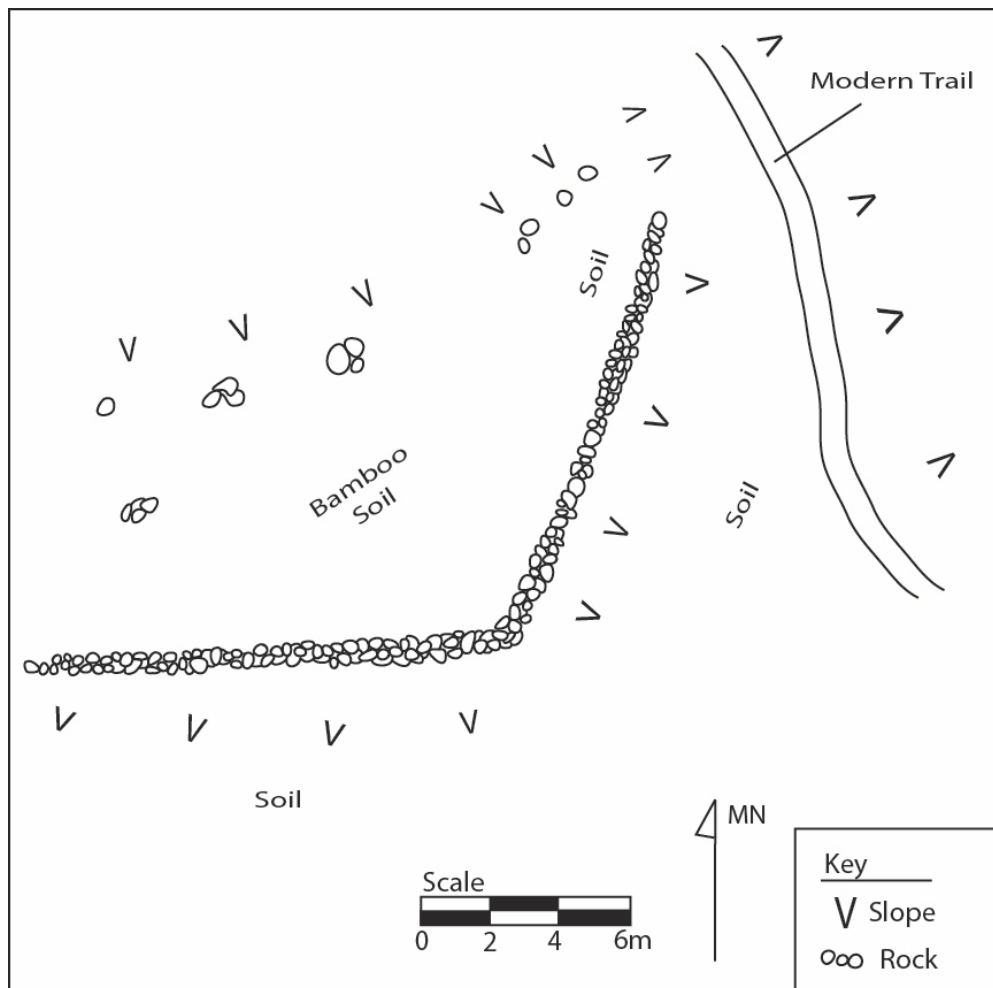
Field No.: T-020

Site Type: Terrace

Site Function: Agriculture

Site Condition: Fair

Description: Site T-020 consists of a large soil terrace with stone retaining wall located at the farthest southern point of the current project area. The terrace is located on the southeast facing side of a ridge, within a large stand of bamboo. Upslope of the terrace consists of a naturally eroding slope with trees, and down slope consists of soil. A walking trail oriented roughly northwest to southeast winds through the bamboo ca. 4.0 meters east of the terrace. The stone retaining wall runs roughly northeast to southwest for ca. 14.0 meters, then turns and runs east to west for ca. 14.0 meters. The retaining wall is constructed of loosely stacked medium to large basalt cobbles and small boulders between one to four courses of stone in height. The interior surface of the terrace consists of a relatively flat area of soil. Overall, the terrace measures ca. 28.0 meters in length by 3.0-4.0 meters in width by 0.6-1.0 meter in height. An L-shaped wall is located to the southwest of Site T-020, but it is outside the current APE by ca. 10.0 meters and was not recorded. Site T-020 appears to have functioned as a traditional agricultural terrace.



Planview map of Site T-020.



Site T-020, terrace, view to northeast.



Site T-020, terrace, view to northwest.

SIHP No.:

Field No.: T-021

Site Type: Complex

Site Function: Water Control

Site Condition: Poor

Description: Site T-021 is a complex comprised of six associated features of an abandoned water storage facility located immediately north of an active water pump facility.

Feature A consists of a large rectangular concrete water storage area located in the center of Site T-021. It measures ca. 17.5 meters in length (north-south) by 11.0 meters in width (east-west) with a maximum depth of 4.0 meters. The interior of Feature A is filled in with soil and several large *hao* trees. Two large metal pipes are visible protruding into the northern portion of the feature. The pipe protruding into the northwest corner measures ca. 0.61 meter (24 inches) in diameter. The pipe protruding into the northeast corner of the feature measures ca. 0.91 meter (36 inches) in diameter, with an old pump connected to the pipe.

Feature B consists of a circular concrete well located ca. 1.0 meter west of Feature A, and has a metal cap covering the opening. The well measures ca. 2.0 meters in diameter by 0.3 meters in height above ground surface. A depth could not be obtained for the feature.

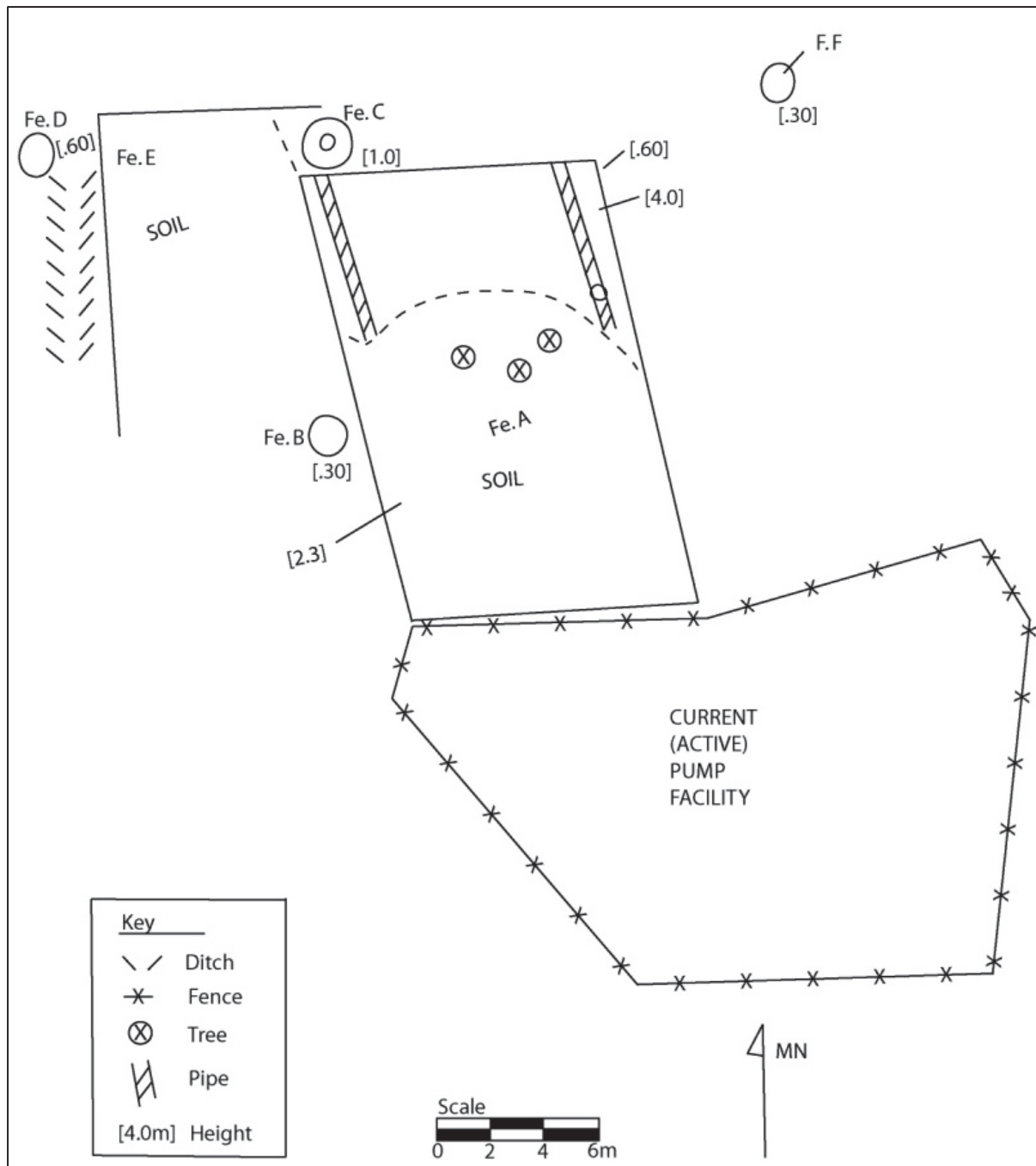
Feature C is a circular brick and mortar well located ca. 0.5 meter north of the northwest corner of Feature A. The well measures ca. 2.4 meters in diameter by 1.16 meters in depth. A metal pipe measuring ca. 0.36 meter (14 inches) in diameter and 2.0 meters in length is sticking out of the center of the well, which is mostly filled in with soil.

Feature D consists of a circular brick and mortar well located at the northwest side of Site T-021. The well measures ca. 1.8 meters in diameter by 0.6 meters in depth. A metal pipe measuring ca. 0.36 meter (14 inches) in diameter and 1.5 meters in length is sticking out of the center of the well, which is mostly filled in with soil.

Feature E is an L-shaped concrete and stone retaining wall located at the northwest side of Site T-021, immediately east of Feature D. The retaining wall runs north to south for ca. 12.0 meters then turns and runs east to west for ca. 8 meters. Overall, it measures ca. 20.0 meters in length by 0.6 meter in width by 0.4 meters in height. A soil ditch is located immediately to the west of the retaining wall.

Feature F is a circular brick and mortar well located ca. 6.0 meters northeast of Feature A. The well measures ca. 2.0 meters in diameter and 1.18 meters in depth. A metal pipe measuring ca. 0.36 meter (14 inches) in diameter and 1.5 meters in length is sticking out of the center of the well, which is mostly filled in with soil.

In addition, an old telephone pole is located 4.0 meters north of Feature A, and the site is littered with corrugated metal and modern trash. Site T-021 appears to be associated with water control related to the former commercial sugar plantation. This is likely the old pump facility shown on the old USGS map.



Planview map of Site T-021.



Site T-021, Fe. A, concrete water storage area, view to southwest.

SIHP No.:

Field No.: T-022

Site Type: Pump House

Site Function: Water Control

Site Condition: Fair

Description: Site T-022 is an active pump house located just off of the Malaekahana access road. The structure is identified as "K12 Pump House" written on an internal electric panel. The structure is surrounded by a chain-linked fence. Over all, the structure measures ca. 6.2 meters in length by 6.0 meters in width, and is constructed of a concrete foundation with plywood and plank sides and corrugated metal roofing. There are two concrete steps located on the southeast side of the structure. A white PVC pipe drains water into an abandoned concrete ditch located on the northeast side. There is an active power pole located on the southwest side of the structure, with an active HECO meter and electric box attached to the southeast side. Site T-022 appears to be associated with water control related to the former commercial sugar plantation and is still in use today, as water can be heard flowing through and seen dripping from internal pipes, as well as draining out of the PVC pipe at the rear of the structure. The abandoned concrete ditch appears to be an over flow since it is sealed by soil on both ends and flows nowhere.



Site T-022, pump house, view to north.



Site T-022, drainage at rear of pump house, view to northwest.



Site T-022, pump house, view to northwest.

SIHP No.:

Field No.: T-023

Site Type: Shed and Concrete Slab

Site Function: Storage

Site Condition: Poor

Description: Site T-023 consists of a plywood shed (Feature A) and a concrete slab (Feature B) located just off of the Malaekahana access road. There is a weighted lift-gate at the front of the property.

Feature A is a plywood shed with a corrugated metal A-frame roof constructed on top of a concrete foundation. The shed measures ca. 15.0 meters in length by 6.8 meters in width by 4.0 meters in height above ground surface. The shed is still in use, and is currently storing various pieces of equipment and supplies.

Feature B is a small concrete slab located to the southeast of the shed. The slab measures ca 7.4 meters in length by 4.1 meters in width. The slab may have been used for parking vehicles. Currently, a black metal trailer frame is parked to the northeast of Feature A and a camouflaged “military” trailer is parked to the north of Feature A.

Site T-023 appears to have functioned as a storage area constructed during the historic period and currently still in use.



Site T-023, Fe. A, shed, view to west.

SIHP No.:

Field No.: T-024

Site Type: Concrete Ditch

Site Function: Water Transport

Site Condition: Fair

Description: Site T-024 consists of a concrete ditch located ca. 53.0 meters west of Site T-019 and ca. 5.0 meters east of an active agricultural field. The ditch is oriented roughly north to south. It is constructed with preformed concrete sections, each measuring ca. 0.9 meter in length. Every two to three sections, there are openings on both sides of the ditch, some of which have metal pieces that may have functioned as adjustable gates regulating water flow. The ditch measures ca. 44.0 meters in length by 0.28 meter in width by 0.21 meter in height. Site T-024 appears to be associated with water transport related to the former commercial sugar plantation.



Site T-024, concrete ditch, view to northwest.

SIHP No.:

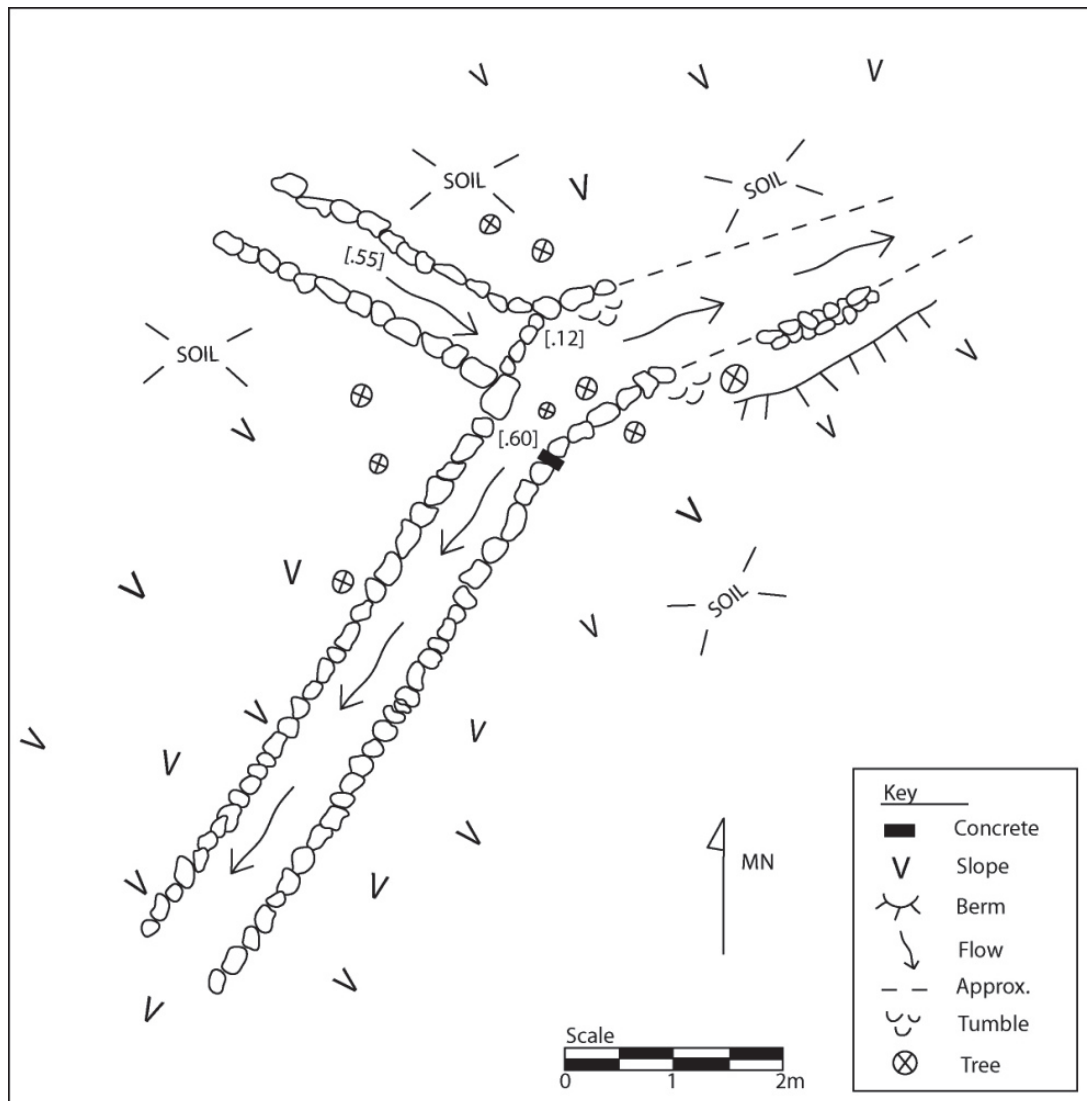
Field No.: T-025

Site Type: Stone Ditch

Site Function: Water Transport

Site Condition: Fair

Description: Site T-025 consists of a Y-shaped stone ditch intersection located on a southeast facing slope. It is constructed of loosely stacked basalt boulders and cobbles up to four courses of stone in height. The main portion of the ditch is oriented roughly northeast to southwest and measures ca. 10.4 meters in length by 0.5 meter in width by 0.3 to 0.6 meter in height. The other segment of the ditch flows into the main portion from upslope to the northwest. This ditch segment is oriented northwest to southeast and measures ca. 3.0 meters in length by 0.6 meter in width by 0.5 meter in height. In addition, several concrete pieces that may have been used to block the flow of water are incorporated into the stacked stone. Site T-025 appears to be associated with water transport related to the former commercial sugar plantation.



Planview map of Site T-025.

DRAFT - Archaeological Inventory Survey

Proposed Nā Pua Makani Wind Project

Kahuku, Keana, and Mālaekahana Ahupua'a, Ko'olau Loa District

April 2015



Site T-025, stone ditch, view to north.



Site T-025, stone ditch, view to view to west.

SIHP No.:

Field No.: T-026

Site Type: Stone Retaining Wall

Site Function: Roadway

Site Condition: Fair

Description: Site T-026 consists of a stone retaining wall constructed of medium to large basalt boulders. It is oriented roughly northeast to southwest, but does bend to the north. The wall supports an old road-cut upslope on the west side of the hillside. At the base of the wall are vestiges of a soil ditch that is mostly destroyed. The retaining wall measures ca. 88.0 meters in length by 2.0-3.0 meters in height. The boulders measure ca 0.35 to 1.3 meters in diameter. Site T-026 appears to have functioned as a retaining wall for a roadway constructed and utilized during the former commercial sugar plantation.



Site T-026, stone retaining wall, view to northwest.

SIHP No.:

Field No.: T-027

Site Type: Stone/Concrete Ditch

Site Function: Water Transport

Site Condition: Fair

Description: Site T-027 consists of a concrete ditch with several channels located adjacent to Site T-026. The ditch is constructed of basalt cobbles cemented in place with concrete, as well as preformed concrete ditch segments. The main ditch is oriented roughly east to west and measures ca. 10.5 meters in length by 0.45 meter in width by 0.3 meter in height. The main ditch flows into a larger concrete ditch, which flows down slope to the southeast and measures ca. 4.0 meters in length by 1.0 meter in width by 1.0 meter in height. A secondary ditch veers off from the main ditch to the northeast and extends for ca. 3.0 meters before it terminates into soil. Another ditch extends to the south for 2.0 meters before ending. Site T-027 appears to be associated with water transport related to the former commercial sugar plantation.



Site T-027, stone/concrete ditch, view to west.

SIHP No.:

Field No.: T-028

Site Type: Complex

Site Function: Water Transport

Site Condition: Fair

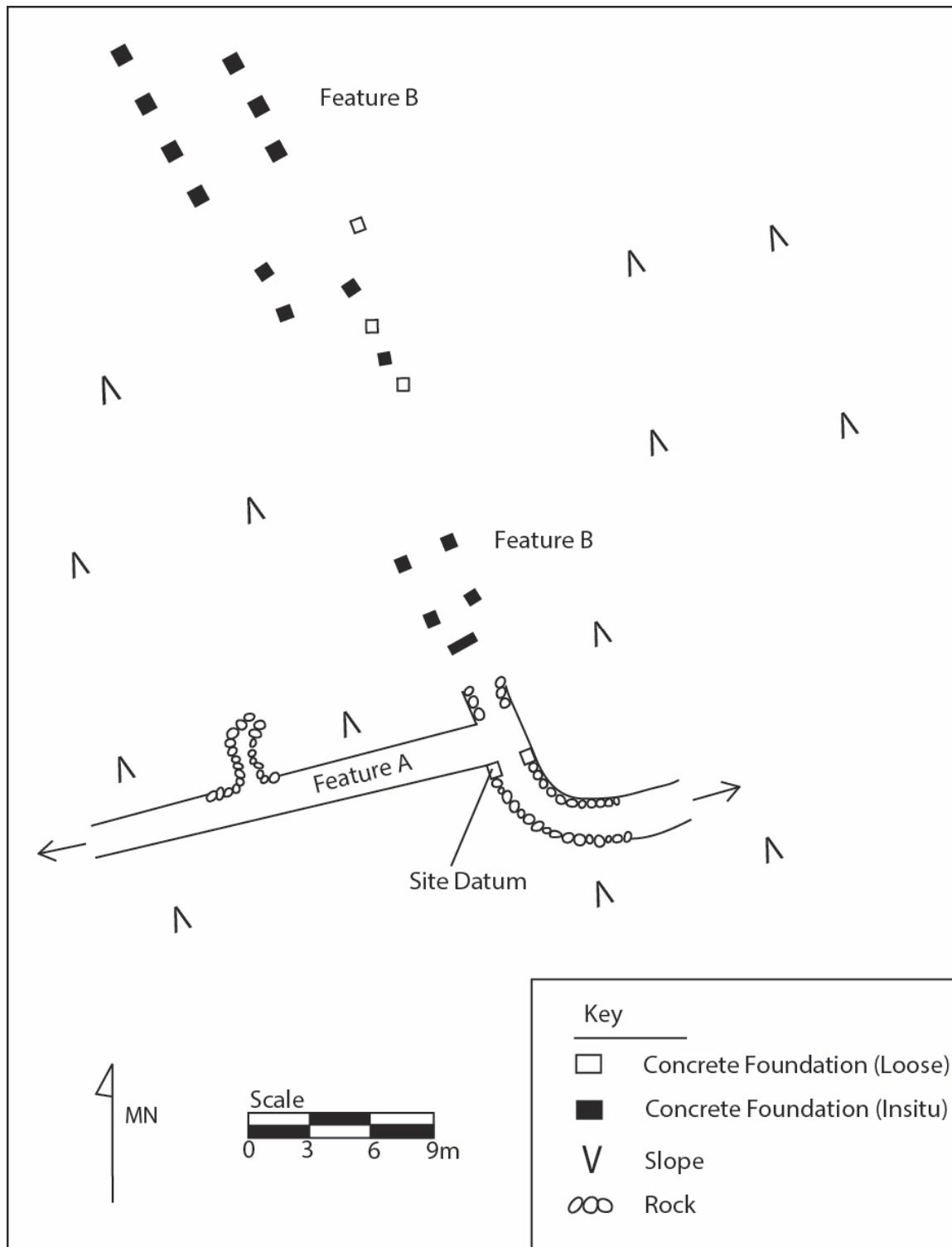
Description: Site T-028 consists of a ditch (Feature A) and a series of concrete foundations (Feature B) located on a northwest facing slope. The ditch is oriented roughly northeast to southwest running across the slope of the hill. The western portion of the ditch is narrower than the eastern portion, although it is longer. The western portion measures ca. 175.0 meters in length by 1.3 meters in width by 0.4 meter in depth. It is constructed predominantly of soil, although several segments are lined with basalt cobbles on the down slope (north) side. The west end terminates at a large boulder outcrop. There are at least two outflow ditches that are partially stone-lined. The outflow ditch to the west measures ca. 5.0 meters in length by 0.4 meter in width by 0.35 meter in height, extending down slope before turning to the northeast and becoming indiscernible.

The eastern portion of the ditch measures ca. 75.0 meters in length by 1.4 meters in width by 0.7 meter in height. The eastern portion is slightly curved and is constructed of basalt cobbles mortared into place with concrete. There is a concrete foundation on both sides of the intersection where the eastern ditch merges with the west. These foundations measure ca. 0.5 meter in length by 0.4 meter in width by 0.75 meter in height. The foundations appear to have been used to support a gate for water. This segment of the ditch was constructed to accommodate large quantities of water. This ditch flows down slope into the vestiges of Feature B and measures ca. 2.6 meters in length by 0.8 meter in width by 0.2 meter in height.

Feature B consists of a series of concrete foundations extending down slope from Feature A towards the valley floor. There are a total of eight sets of concrete foundations oriented roughly northwest to southeast in two parallel lines. The foundations are set ca. 1.2 meters apart in each row, with the rows separated by ca. 3.0 meters. Each foundation is pyramid-shaped with a flat top and indentation where a beam or stand may have been. They measure ca. 0.30 meters in length by 0.30 meters in width by 0.35 meter in height. These footings were likely used to support a pipe or open ditch, although there is no current evidence of such a structure.

In addition, three historic glass bottles were observed at Site T-028, including a clear glass soda bottle with no markings, a green Rycroft bottle, and a green Gilbey gin bottle.

Site T-028 appears to be associated with water transport related to the former commercial sugar plantation.



Planview map of Site T-028.



Site T-028, Fe. A, ditch, view to south.



Site T-028, Fe. B, concrete foundations, view to northwest.

SIHP No.:

Field No.: T-029

Site Type: Complex

Site Function: Water Transport

Site Condition: Fair

Description: Site T-029 consists of three semicircular (c-shaped) abutting stone-lined ditch features located on a north facing slope. The ditches are shallow and short in length without well-defined beginnings to indicate the origins of the water flow.

Feature A is the longest ditch and is constructed of loosely stacked basalt cobbles between three to four courses of stone in height along a soil ditch. It measures ca. 1.2 meters in length by 1.1 meters in width by 0.5 meter in depth. The soil ditch runs to the southeast and measures ca. 7.0 meters in length by 0.7 meter in width by 0.5 meter in depth.

Feature B is located ca. 0.70 meter to the west of Feature A and is similar in style, but smaller in size. Features A and B are constructed back to back and form a small walkway over the ditches. The area between the features consists of soil, and there appears to be no opening for water to flow between them. Feature B measures ca. 0.4 meter in length by 0.5 meter in width by 0.25 meter in depth. It is constructed of basalt cobbles that have been loosely stacked up to two courses of stone in height. The soil ditch runs to the west for ca. 3.0 meters.

Feature C is situated ca. 0.5 meter to the northeast of Feature A. It is the smallest feature, although it is similar in shape and style to Features A and B. Feature C is constructed of basalt cobbles that have been loosely stacked between two to three courses of stone in height. The ditch measures ca. 0.5 meter in length by 0.7 meter in width by 0.4 meter in height. The soil ditch runs to the northeast for ca. 10.0 meters before terminating down slope. Like Features A and B, the gap between Features A and C consists of soil and resembles a walkway.

Site T-029 appears to be associated with water transport related to the former commercial sugar plantation.



Site T-029, Fe. A, stone-lined ditch, view to northwest.



Site T-029, Fe. B, stone-lined ditch with Fe. A in background, view to east.



Site T-029, Fe. C, stone-lined ditch with Fe. A in background, view to south.

SIHP No.:

Field No.: T-030

Site Type: Complex

Site Function: Water Transport

Site Condition: Fair

Description: Site T-030 consists of a complex located along the southwestern edge of the current APE, in between Site T-070 and Site T-071.

Feature A consists of a long soil ditch oriented roughly northeast to southwest. It measures ca. 142.0 meters in overall length by 0.8-1.0 meter in width by 0.0-0.3 meter in depth. The ditch extends at least ca. 9.0 meters outside of the current project area to the southwest.

Feature B is a stone retaining wall constructed along the exterior bend of Feature A, near the northeast end of the ditch. The retaining wall is constructed of basalt cobbles that have been loosely stacked between three to six courses of stone in height. The wall supports a 90° bend in the Feature A, ditch. The northern portion of the wall runs to the northwest and measures ca. 5.6 meters in length by 0.3-0.7 meter in height. The southern segment runs to the southwest and measures ca. 12.0 meters in length by 0.45-0.8 meter in height. The corner where the two retaining wall segments meet is partially tumbled, exposing soil and stacked stones, one course deep. An orange plastic survey stake is located adjacent to Feature B indicating the approximate location of the property boundary.

Feature C consists of a stone retaining wall located ca. 4.0 meters down slope to the north of the Feature A, ditch, and 39.0 meters southwest of the Feature B, retaining wall. The retaining wall is oriented roughly northwest to southeast and is constructed of basalt cobbles and boulders loosely stacked between one to six courses of stone in height. The wall measures ca. 3.4 meters in length by 0.4 and 0.9 meters in width by 1.0 meter in height. There is a visible corner located at the northwest end of the feature. The wall continues for 1.1 meters from the corner, where it terminates into the slope of the hill. The retaining wall appears to have been constructed to support the down slope side of the Feature A, ditch.

Feature D is a concrete ditch situated within the Feature A, ditch, located ca. 18.0 meters north of the southern terminus of Feature A. Feature D is oriented roughly north to south and measures ca. 7.5 meters in length by 0.5-0.95 meter in width by 0.53-0.70 meter in depth. The northern third of Feature D is constructed of basalt cobbles cemented in place. There is steel pipe measuring ca. 0.28 meter (11 inch) in diameter, protruding from the ditch, extending down slope to the northeast. The central portion of the ditch is constructed of loosely stacked basalt cobbles on the upslope side and cemented basalt cobbles on the down slope side. The southern third of the ditch is constructed of solid concrete that has been formed and poured in place. On both ends of this section, slits are present indicating gates were once in place. This section also contains a steel pipe measuring ca. 0.28 meter (11 inch) in diameter, with the opening sealed shut with concrete. The angle of both of the metal pipes indicates water in this portion of the trench flowed to the north.

Site T-030 appears to be associated with water transport related to the former commercial sugar plantation.



Site T-030, Fe. B, stone retaining wall, view to southeast.



Site T-030, Fe. D, concrete ditch, view to north.

SIHP No.:

Field No.: T-031

Site Type: Terraced Soil Furrows

Site Function: Agriculture

Site Condition: Fair

Description: Site T-031 consists of a series of terraced soil furrows located along the southwest edge of the project area, ca. 30.0 meters down slope to the northwest of Site T-030. Overall, the site measures ca. 40.0 meters in length (north-south) by 30.0 meters in width (east-west). The furrows are relatively uniform in appearance and each measures ca. 30.0 meters in length (east-west) by 1.3 meters in width (north-south) by 0.15 meter in height. Site T-031 closely resembles the other terraced soil furrows recorded in the area (Site T-033, T-071). Site T-031 appears to have functioned as an agricultural field during the historic period.



Site T-031, terraced soil furrows, view to southeast.

SIHP No.:

Field No.: T-032

Site Type: Terrace

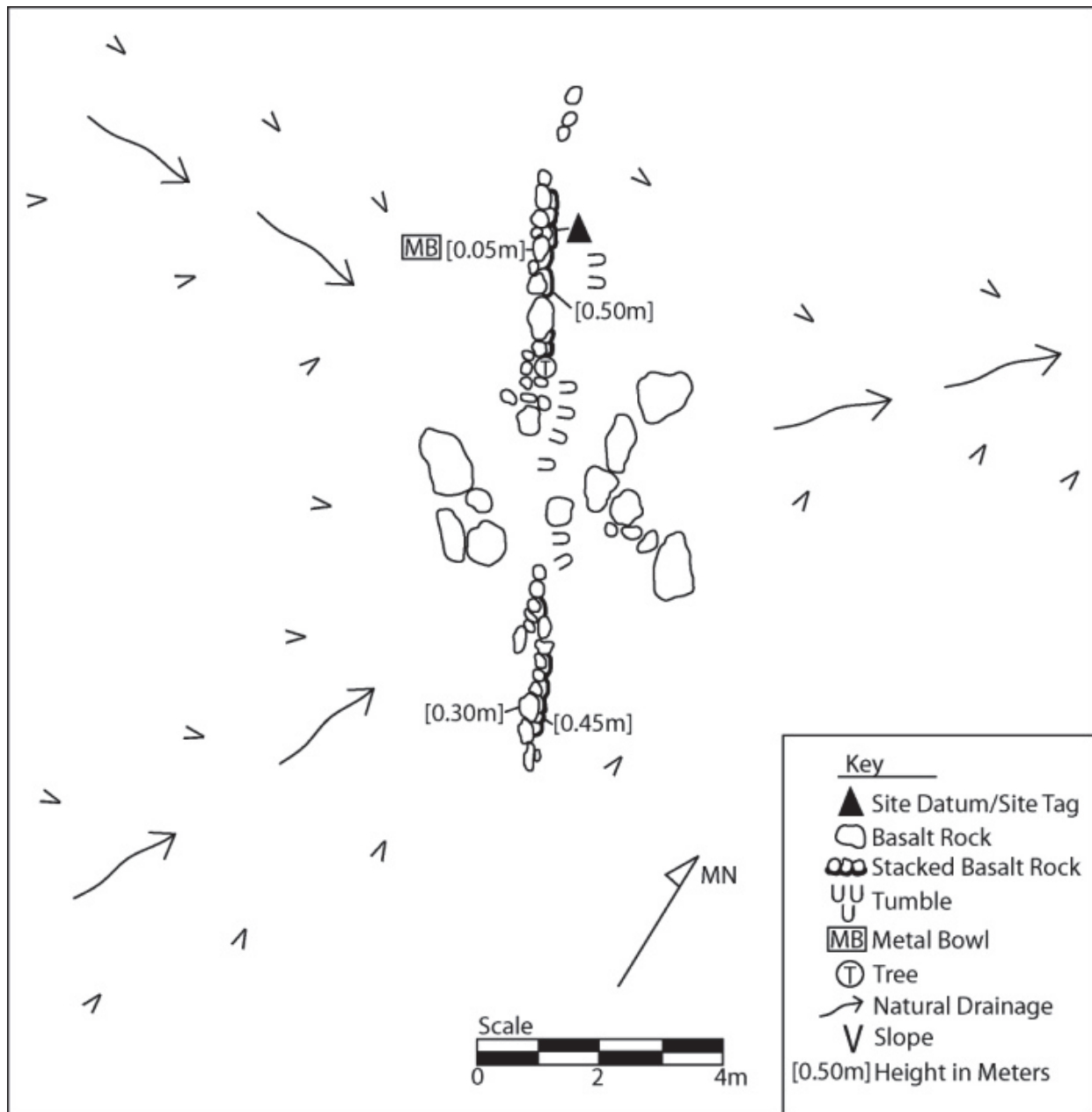
Site Function: Agriculture

Site Condition: Fair

Description: Site T-032 consists of a soil terrace with a linear stone retaining wall located near the southwest edge of the current APE. The terrace is oriented roughly northwest to southeast, and spans the convergence of two small drainages. The stone retaining wall is constructed of large basalt cobbles and small to medium basalt boulders that have been loosely stacked between one to two courses of stone in height. The surface of the terrace consists of a relatively flat area of soil. Overall, the terrace measures ca. 10.0 meters in length by 2.5 meters in width by 0.5 meter in height along the northeast edge. There is a gap at the center of the terrace measuring ca. 2.0 meters in length. Both ends of the terrace extend up into the sides of the drainage. The central portion of the terrace has been impacted by water flowing through the drainages. The western side of the terrace is in better condition and contains more soil than the eastern portion. A small historic metal bowl was observed on the western portion of the terrace. The bowl is gray and rusted, and measures ca. 18.0 centimeters in diameter by 8.0 centimeters deep. Site T-032 appears to have been used for agriculture during the historic period.



Site T-032, terrace, view to south.



Planview map of Site T-032.

SIHP No.:

Field No.: T-033

Site Type: Terraced Soil Furrows

Site Function: Agriculture

Site Condition: Fair

Description: Site T-033 consists of a series of terraced soil furrows located near the southwest edge of the current APE, ca. 0.5 meter northeast of Site T-032. The furrows run roughly northeast to southwest along a southeast facing slope. Overall, the site measures ca. 31.0 meters in length (northeast-southwest) by 26.0 meters in width (northwest-southeast). There are approximately 10 furrows going up the slope, where they disappear into a thick mass of lantana bushes. The furrows are relatively uniform in appearance and each measures ca. 31.0 meters in length by 1.0 meter in width by 0.15 meter in height. Site T-033 closely resembles the other terraced soil furrows recorded in the area (Site T-031, T-071). Site T-033 appears to have functioned as an agricultural field during the historic period.



Site T-033, terraced soil furrows, view to north.

SIHP No.:

Field No.: T-034

Site Type: Complex

Site Function: Water Transport/Control

Site Condition: Fair

Description: Site T-034 consists of a complex comprised of a soil ditch (Feature A) and a concrete footing (Feature B) located in the southwest portion of the current project area.

Feature A consists of a long soil ditch oriented roughly east to west and measuring ca. 350.0 meters in total length by 0.80-1.5 meters in width by 1.0 meter in depth. The east end of the ditch terminates near a dirt access road. Near the east end of the ditch is a segment lined with basalt and limestone cobble and boulder stacking on the south side of the ditch. The stacking is slightly curved and appears to have been used to retain the soil slope above the ditch. The stone stacking measures ca. 4.8 meters in length by 0.4 meter in width by 0.95 meter in height. There is also a second set of stone stacking located near the east end of the ditch, to the west of Feature B, that measures ca. 2.7 meters in length by 0.3 meter in width by 0.5 meters in height. Located ca. 0.3 meter northeast of this stacking are the concrete supports of a gate which is no longer present. The concrete supports measure ca. 1.5 meters in length by 0.63 meter in height and there is a 0.6 meter opening where the gate used to be. Basalt and limestone cobble stacking is present on both sides of the concrete supports in order to hold them in place. The west end of the ditch terminates into a natural drainage above an active agricultural farm. Feature A appears to be associated with water transport related to the former commercial sugar plantation.

Feature B is a concrete footing located at the eastern end of the Feature A, ditch, approximately 1.5 meters north of the small stone lined portion of the ditch. The footing measures ca. 3.6 meters in length by at least 2.6 meters in width by 0.6 meter in height. The southern portion of the feature extends into the existing slope making it impossible to determine the overall width. The surface of the footing is filled in with soil and there is a broken off steel pipe measuring ca. 0.15 meters (6 inches) in diameter that extends out of the concrete. The pipe likely connected to another pipe with a 90° bend that is sticking out of the ground in front of the footing. A metal grate is also located near the pipe. Four pieces of rebar also extend out of the ditch near the footing. Feature B appears to be associated with water control related to the former commercial sugar plantation.

A clear glass wine bottle with a screw cap was found on the surface of the Feature B, concrete footing. The base is embossed with "CALIFORNIA WINE ASSOC. -SAN FRANCISCO CA.-REILLING PROHIBITED- 3665 L." It is a half-gallon jug with diamonds embossed around the neck. The bottle was not collected.

Site T-034 appears to be associated with water transport and control related to the former commercial sugar plantation.



Site T-034, Fe. A, soil ditch, view to east.



Site T-034, Fe. A, soil ditch, view to west.



Site T-034, Fe. B, concrete footing, view to south.



Site T-034, glass bottle, view to east.

SIHP No.:

Field No.: T-035

Site Type: Concrete Ditch

Site Function: Water Transport

Site Condition: Poor

Description: Site T-035 consists of a concrete ditch located in the southwestern portion of the project area, ca. 50.0 meters southwest of an active agricultural farm. The ditch curves around the contour of a slope in a roughly east to west direction. The west end of the ditch ties into the Site T-034, soil ditch, and the east end terminates at an area that has been previously bull-dozed. The ditch is constructed of preformed concrete segments, each measuring ca. 1.22 meters in length. Every other segment has openings on both sides measuring ca. 0.15 meter in length by 0.09 meter in width, with a metal cover used to allow water to flow out of the ditch. Overall, the ditch measures ca. 88.0 meters in length by 0.28 meter in exterior width by 0.23 meter in interior width by 0.2 meters in exterior height by 0.16 meters in interior depth. The concrete walls of the ditch are ca. 0.025 meters thick, but at each opening the concrete is slightly thicker measuring ca. 0.09 meters in thickness. Site T-035 appears to be associated with water transport related to the former commercial sugar plantation.



Site T-035, concrete ditch, view to southeast.

SIHP No.:

Field No.: T-036

Site Type: Stacked Stone Ditch

Site Function: Water Transport

Site Condition: Good

Description: Site T-036 consists of a stacked stone ditch located approximately 8.0 meters down slope to the northeast of the Site T-034, soil ditch, and ca. 10.0 meters south of the Site T-037, concrete ditch. It is likely that Site T-034 fed into Site T-036. It is situated on an east facing slope. The ditch runs down slope to the east and then feeds into a T-shaped intersection that is oriented roughly north to south across the slope.

The east to west portion of the ditch is constructed of basalt boulders and cobbles that have been nicely stacked between two to five courses of stone in height. It measures ca. 2.0 meters in length by 0.75 meters in width by 0.5-1.2 meters in height. The south wall is ca. 0.2 meters thick and the north wall is 0.25 meters thick. The interior of the ditch measures ca. 0.3 meter in width and the ground is littered with rocks and leaves, as well as two tree stumps. There are two vertical concrete slabs facing one another at the west end of the east to west portion of the ditch. These likely would have housed a metal gate.

The north-south portion of the ditch extends along the slope and is constructed of basalt boulders and cobbles that have been nicely stacked between five to six courses of stone in height along the west side. It measures ca. 14.0 meters in length by 0.10 meter in width by 1.2 meters in height. The east side of the ditch is significantly shorter and constructed of basalt boulders that have been loosely stacked between one to two courses of stone in height, measuring ca. 0.3 meters in width by 0.1-0.3 meter in height. The interior of the ditch measures ca. 0.35-0.45 meters in width and is littered with rocks, leaves, and deadfall. The ditch merges into the slope at both the north and the south end.

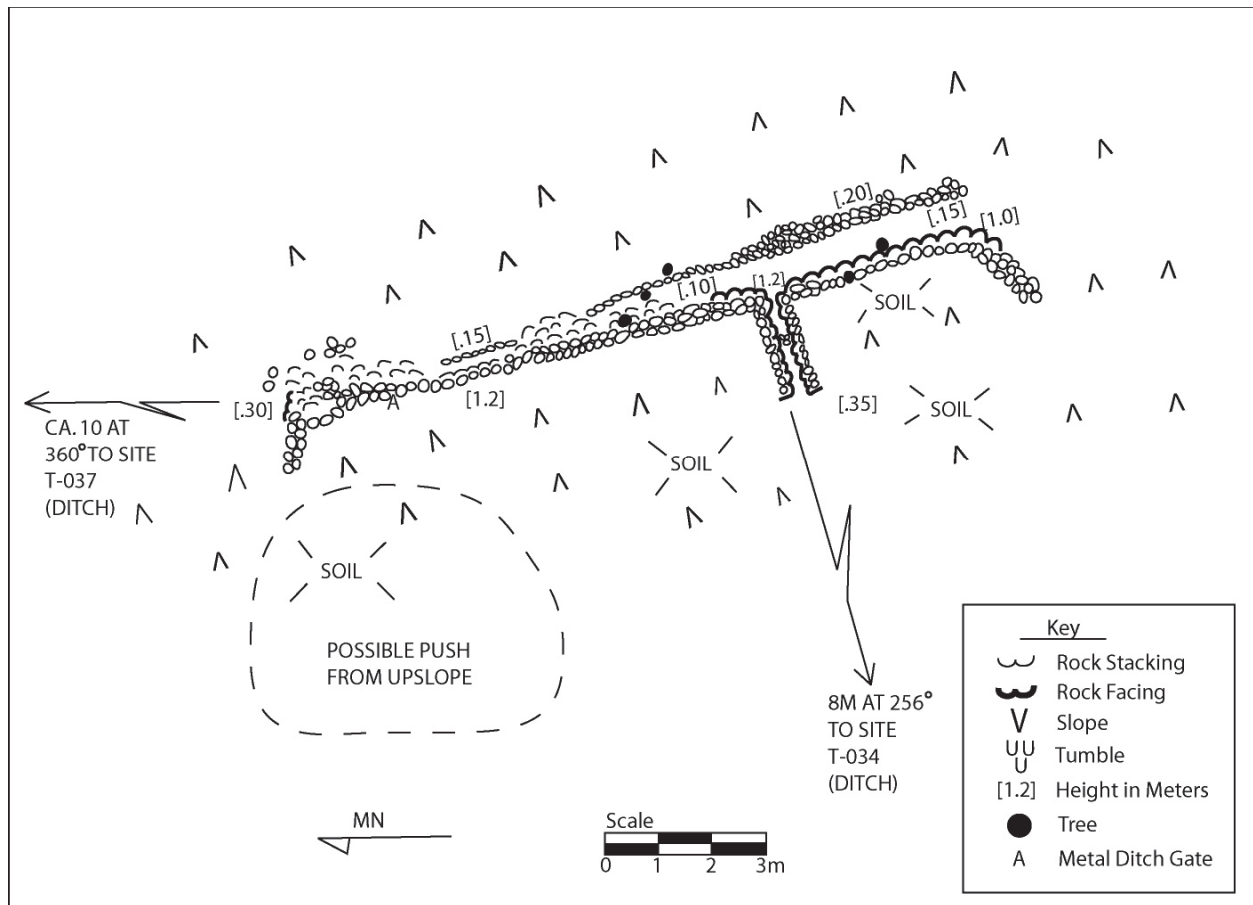
Site T-036 appears to be associated with water transport related to the former commercial sugar plantation.



Site T-036, stacked stone ditch, view to north.



Site T-036, stacked stone ditch, view to west.



Planview map of Site T-036.

SIHP No.:

Field No.: T-037

Site Type: Concrete Ditch

Site Function: Water Transport

Site Condition: Fair

Description: Site T-037 is a concrete ditch located immediately down slope of the Site T-034, soil ditch, and ca. 10.0 meters north of the Site T-036, stacked stone ditch. The ditch is oriented roughly northeast to southwest and is constructed of preformed concrete segments each measuring ca. 0.8 meters in length. The slope of the hill is relatively steep at the southwest end, but gradually becomes flatter as it extends down slope to the northeast. At the southwest end, Site T-037 connects with Site T-034, which would have fed into Site T-037. Overall, the ditch measures ca. 60.0 meters in length by 0.48 meters in width by 0.27 meters in height. The sides of the concrete segments measure ca. 0.03 meters in thickness. Every 2.0-3.0 meters there is a square or rectangular opening in the side of the ditch which holds a metal gate used to allow water to flow out of the ditch. The first ca. 4.0 meters at the southwest end are lined with sheet metal. In some areas, tree growth has disturbed some of the segments. Site T-037 appears to be associated with water transport related to the former commercial sugar plantation.



Site T-037, concrete ditch, view to southwest.

SIHP No.:

Field No.: T-038

Site Type: Stone Alignment

Site Function: Water Transport

Site Condition: Poor

Description: Site T-038 consists of a linear stone alignment located ca. 19.0 meters southwest of the Site T-035, concrete ditch. The alignment is situated in a shallow drainage between two relatively flat soil areas. It is oriented roughly east to west and measures 5.0 meters in length by 0.4 meters in width by 0.5 meter in height. The alignment is constructed of basalt boulders set in a line. Tucked within the alignment are several small pieces of limestone which does not occur naturally in the area. There is a piece of metal measuring ca. 3.0 meters in length located on the south side of the alignment. It is possible that the metal was used in conjunction with the alignment, perhaps resting on or alongside the alignment to transport water down slope. Site T-038 is in poor condition. The east and west ends appear to have been damaged by water flow. Site T-038 appears to be associated with water transport related to the former commercial sugar plantation.



Site T-038, stone alignment, view to southeast.

SIHP No.:

Field No.: T-039

Site Type: Overhang Shelter with Terrace

Site Function: Habitation

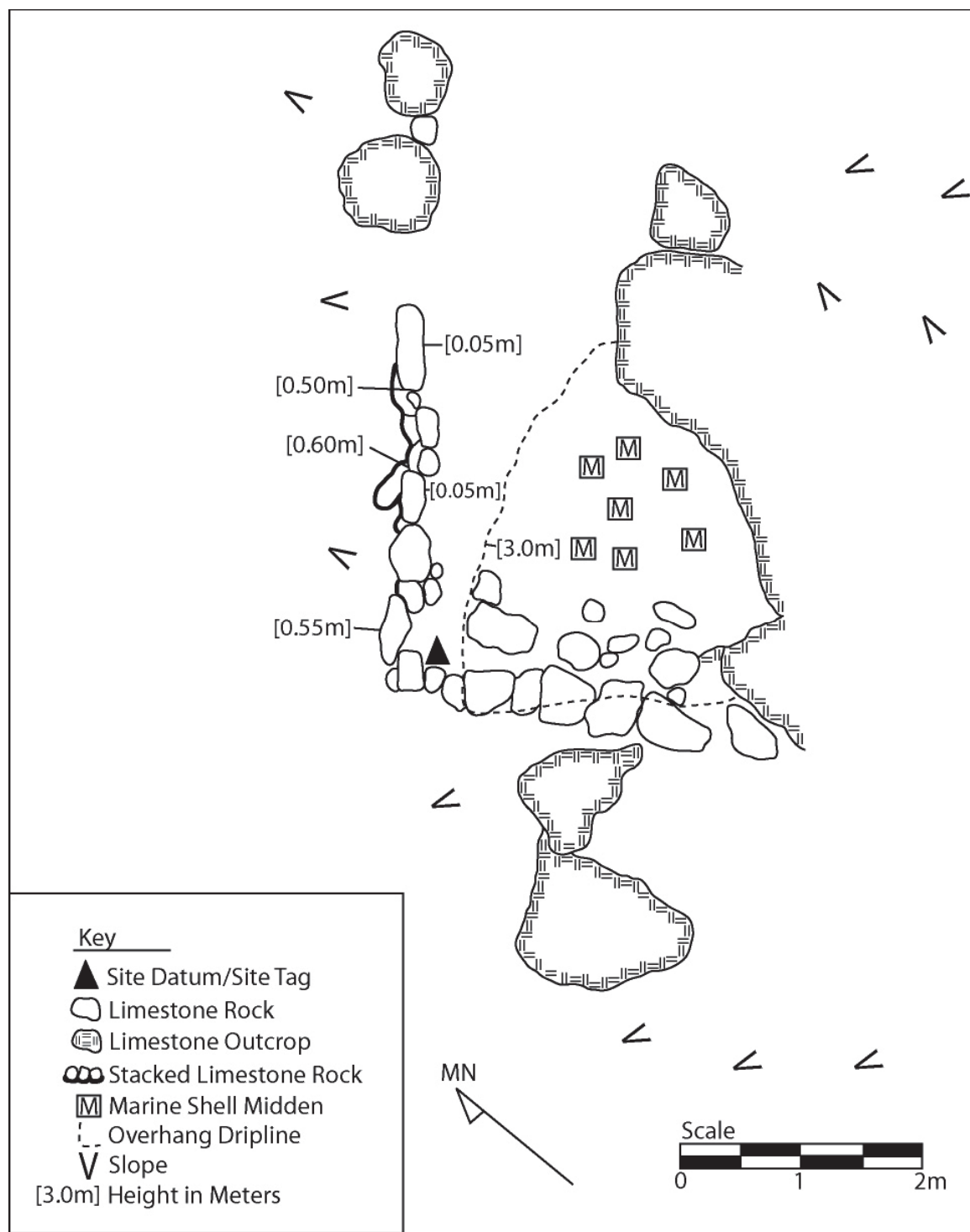
Site Condition: Fair

Description: Site T-039 consists of a limestone overhang shelter (Feature A) and a soil terrace with an L-shaped stone retaining wall (Feature B) located in the north-central portion of the project area. It is situated along a limestone cliff face ca. 35.0 meters northeast from Site T-043.

Feature A consists of a limestone overhang shelter that opens to the northwest. It measures 3.2 meters in length by 2.0 meters in depth by 3.0 meters in height. The interior surface of the overhang consists of soil with limestone pebbles and small cobbles, as well as leaves and dead branches. The surface has been disturbed by chickens living in the vicinity. Several fragments of marine shell midden were observed on the interior surface of the overhang including one complete cone shell, one fragment of a cone shell, and five *pipipi*.

The interior surface of the overhang is supported by Feature B, which consists of a soil terrace with an L-shaped stone retaining wall. The retaining wall is constructed of partially stacked limestone boulders. The terrace extends ca. 1.0 meter out beyond the drip line of the overhang. The long axis of the retaining wall is oriented northeast to southwest and measures ca. 3.25 meters in length by 0.1-0.4 meters in width by 0.6 meter in height along the northwest edge and 0.05 meter in height along the southeast edge. The short axis is oriented roughly northwest to southeast and measures ca. 3.5 meters in length by 0.2-0.5 meters in width by 0.2-0.5 meters in height. The soil surface of the terrace measures ca. 3.0 meters in length (northeast-southwest) by 3.0 meters in depth (northwest-southeast).

Site T-039 appears to have functioned as a traditional habitation site.



Planview map of Site T-039.



Site T-039, Fe. A, overhang shelter and Fe. B, terrace, view to southeast.



Site T-039, sample of marine shell midden observed on interior surface of overhang.

SIHP No.:

Field No.: T-040

Site Type: Complex

Site Function: Habitation/Agriculture

Site Condition: Fair

Description: Site T-040 is a complex comprised of five associated terraces located in the central portion of the project area, ca. 25.0 meters upslope to the south of an active agricultural farm. The site is situated along the north side of a limestone cliff face.

Feature A consists of a soil terrace with a stone retaining wall situated along the north side of a limestone cliff face in the eastern portion of the site, immediately east of Feature B. It is the largest terrace at Site T-040, measuring ca. 11.0 meters in length by 3.5 meters in depth by 0.05-0.8 meters in height. The stone retaining wall is constructed of limestone boulders and cobbles that have been loosely stacked between two to three courses of stone in height. The terrace also utilizes several natural limestone outcrops. Some of the stones from the retaining wall have tumbled down slope. The surface of the terrace consists of a relatively flat area of soil that abuts the limestone cliff face to the south, which measures ca. 6.0 meters in overall height. There are some small overhangs along the cliff face, but they do not appear to have been utilized. There is a small circular soil depression located on the eastern portion of the surface of the terrace measuring ca. 0.7 meter in length by 0.6 meter in width by 0.12 meter in depth. It is unclear what the depression is, but it may be the hole left by an old fallen tree. A historic aqua glass bottle base is located within the depression. The bottle base is embossed with the "Diamond O-I" maker's mark indicating Owens-Illinois Glass Company manufacture. A few small unmodified basalt cobbles were also observed on the surface of the terrace. Feature A appears to have functioned as a traditional habitation terrace.

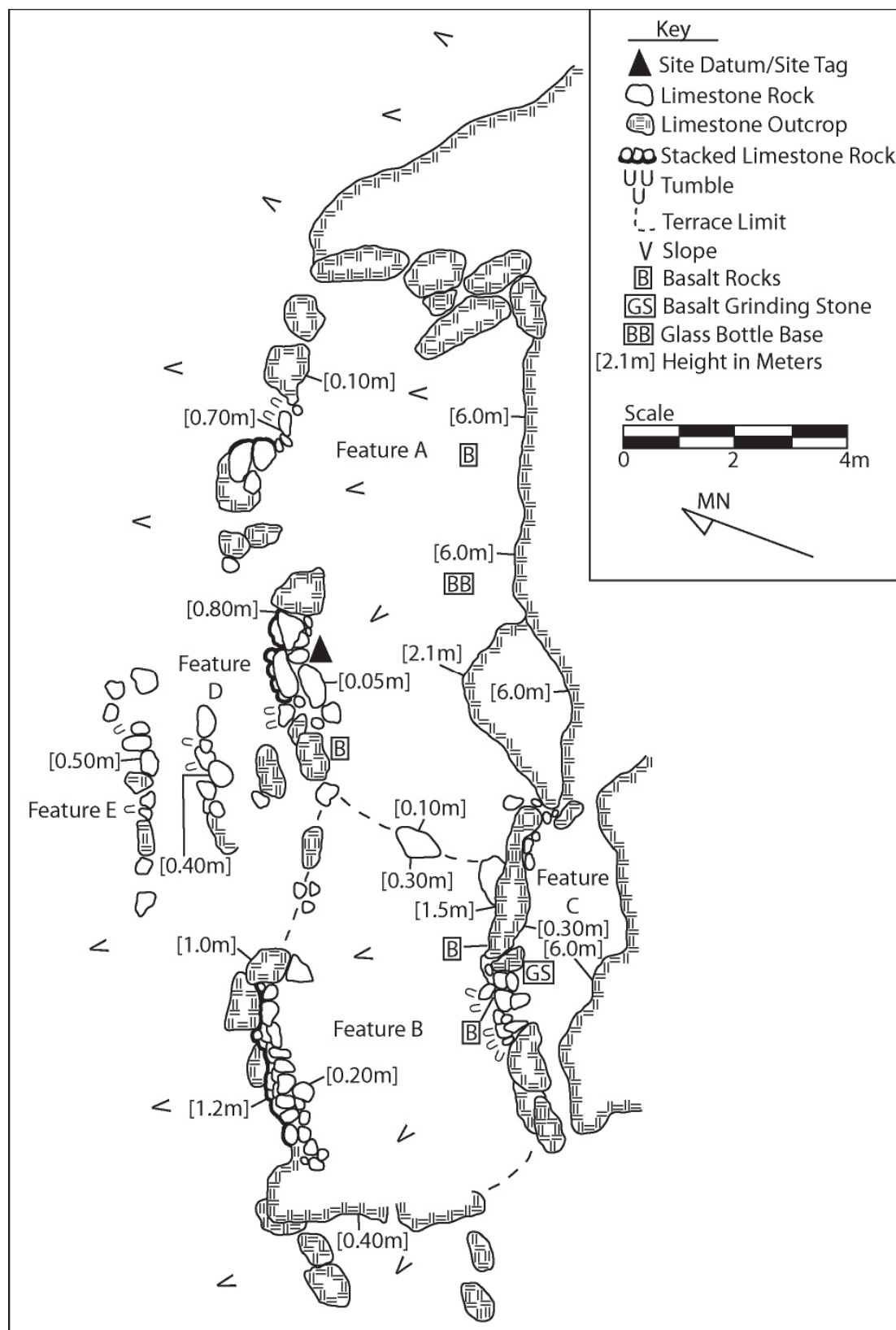
Feature B consists of a soil terrace with stone retaining wall situated on the west side of Site T-040, immediately west of Feature A and northwest of Feature C. The terrace measures ca. 6.0 meters in length by 4.0 meters in depth by 0.20-1.2 meters in height. The stone retaining wall is constructed of limestone boulders and cobbles that have been loosely stacked between two to six courses of stone in height. The terrace also utilizes several natural limestone outcrops. The surface of the terrace consists of a relatively flat area of soil that abuts Feature C to the southeast. There is a step down between Feature A and Feature B measuring ca. 0.1-0.3 meters in height which was likely edged with stone at one time, but most of the stone are now missing. Feature B appears to have functioned as a traditional habitation terrace.

Feature C is a small soil terrace with stone retaining wall located up against the base of the limestone cliff, at the rear of the Feature B, terrace. The terrace measures ca. 3.9 meters in length by 2.5 meters in depth by 0.3-1.5 meters in height. The stone retaining wall is constructed of limestone boulders and cobbles that have been loosely stacked up to three courses of stone in height in between several medium to large natural limestone outcrops. The surface of the terrace consists of an uneven area of soil and loose rock that abuts the cliff face which measures ca. 6.0 meters in overall height. The stacked portion of the retaining wall has partially tumbled out onto the surface of Feature B. One artifact was observed consisting of a basalt grinding stone located on the surface of Feature C, near the stone retaining wall. The stone is smooth and has visible use wear on at least two of the sides. It measures ca. 20.0 centimeters in length by

15.0 centimeters in width by 13.0 centimeters in thickness. The grinding stone was photographed, but not collected. At least two unmodified basalt cobbles were observed near the tumble from the stone retaining wall. Feature C appears to have functioned as a traditional habitation terrace.

Feature D consists of a soil terrace with stone retaining wall located immediately down slope to the northwest of Feature A. The terrace measures ca. 2.9 meters in length by 1.0 meter deep by 0.0-0.4 meter in height. The stone retaining wall is constructed of limestone boulders and cobbles that have been loosely stacked up to two courses of stone in height. A natural limestone outcrop is also incorporated into the western end of the retaining wall. Some of the stones from the retaining wall have tumbled down slope. The surface of the terrace consists of a sloped area of soil and rock that abuts the retaining wall of Feature A at the rear. Feature D appears to have functioned as a traditional agricultural terrace.

Feature E is a soil terrace with stone retaining wall located immediately down slope to the northwest of Feature E. The terrace measures ca. 3.9 meters in length by 1.0 meter deep by 0.0-0.5 meter in height. The stone retaining wall is constructed of limestone boulders and cobbles that have been loosely stacked up to two courses of stone in height. The terrace also utilizes several natural limestone outcrops. Some of the stones from the retaining wall have tumbled down slope. The surface of the terrace consists of a sloped area of soil and rock that abuts the retaining wall of Feature D at the rear. Feature E appears to have functioned as a traditional agricultural terrace.



Planview of Site T-040.



Site T-040, Fe. A, terrace, view to northeast.



Site T-040, Fe. B, terrace, view to southeast.



Site T-040, Fe. C, terrace, view to east.



Site T-040, Fe. D, terrace, view to southeast.



Site T-040, Fe. E, terrace, view to north.

SIHP No.:

Field No.: T-041

Site Type: Filled Crevice

Site Function: Possible Burial

Site Condition: Fair

Description: Site T-041 is a filled limestone crevice located in the north-central portion of the project area, and situated along a limestone cliff on a ca. 35° slope. The surrounding vegetation includes *koa haole*, banyan, and a stand of *ti* located ca. 3.0 meters away. The crevice is near the top of a limestone cliff, but under a large limestone boulder slab which creates a small, cave-like overhang. The crevice measures ca. 0.9 meter in length by 0.3 meter in width, and is filled with small limestone slabs measuring ca. 0.15-0.3 meter in diameter by 0.05-0.1 meter in thickness. The area adjacent to the filled crevice does not contain any roof fall or debris suggesting that the material within the crevice is likely intentional. No cultural material was observed in the area. Site T-041 appears to be traditional in construction. Although no human skeletal remains were observed at the site, based on the style of construction, it is possible that a human burial may be present within the filled crevice.



Site T-041, filled crevice, view to east.

SIHP No.:

Field No.: T-042

Site Type: Terrace

Site Function: Agriculture

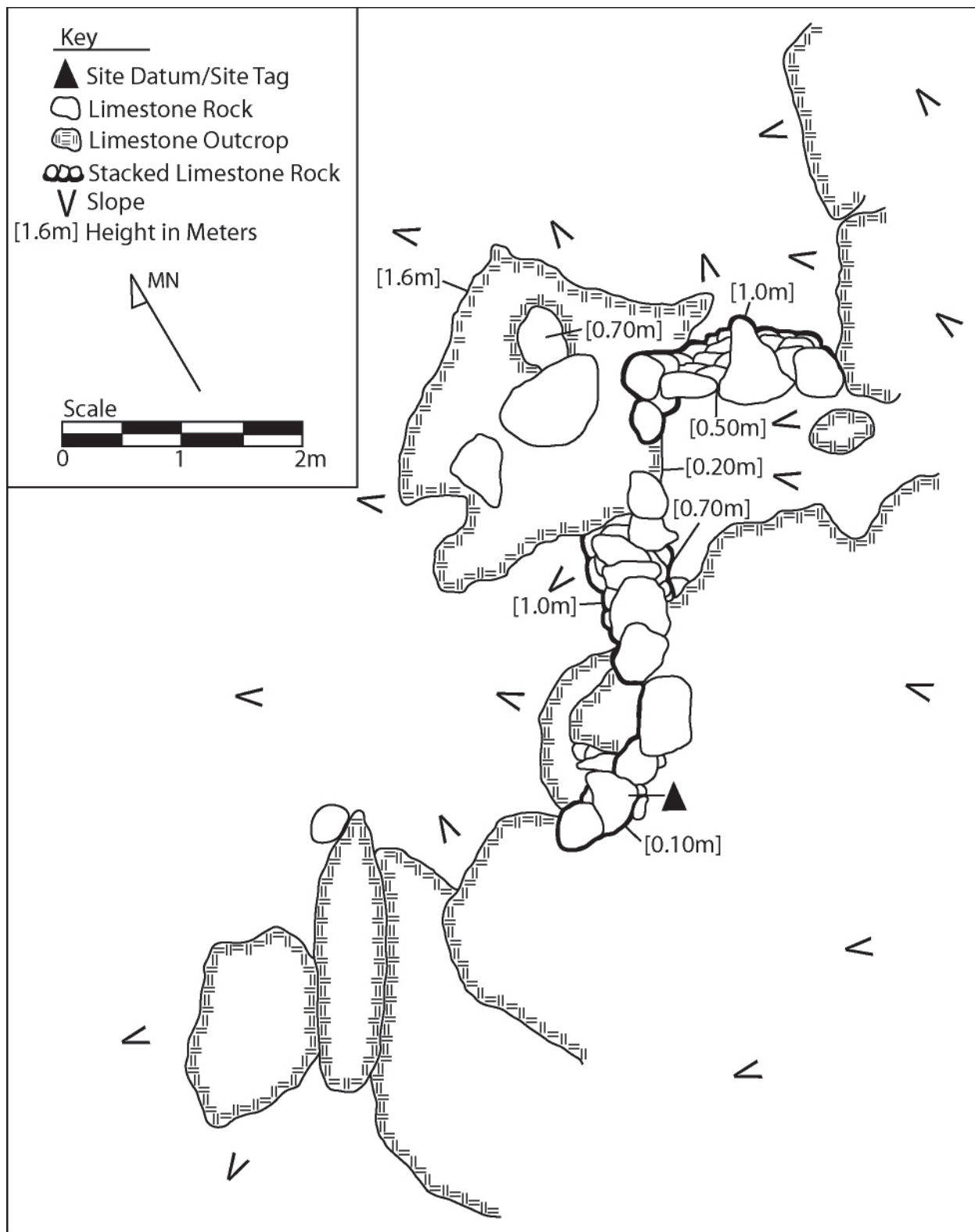
Site Condition: Fair

Description: Site T-042 consists of a terrace located in the north-central portion of the project area, near the top of a limestone cliff. The site is situated ca. 20.0 meters north/northeast of the Site T-041, filled crevice, on the same slope. Vegetation in the area includes *koa haole*, *noni*, banyan, *hau*, and Christmas berry. The feature is a stacked limestone terrace incorporating natural limestone outcrops. Overall, the terrace measures ca. 5.5 meters in length by 2.5 meters in width by 1.0 meter in height. The terrace wall is roughly L-shaped and built into the slope. The stone retaining wall is constructed of loosely stacked limestone boulder slabs and cobbles. The interior portion of the retaining wall is two courses of stone in height, while the exterior portion of the wall is between four to five courses high. The northern portion of the terrace is hollowed out and resembles a planting area. A small banyan tree is growing within the terrace on the north side, where a soil deposit is present. The south end of the terrace consists of soil and limestone outcrop.

Site T-042 appears to have functioned as a traditional agricultural terrace.



Site T-042, terrace, view to south.



Planview map of Site T-042.

SIHP No.:

Field No.: T-043

Site Type: Stone Lined Drainage

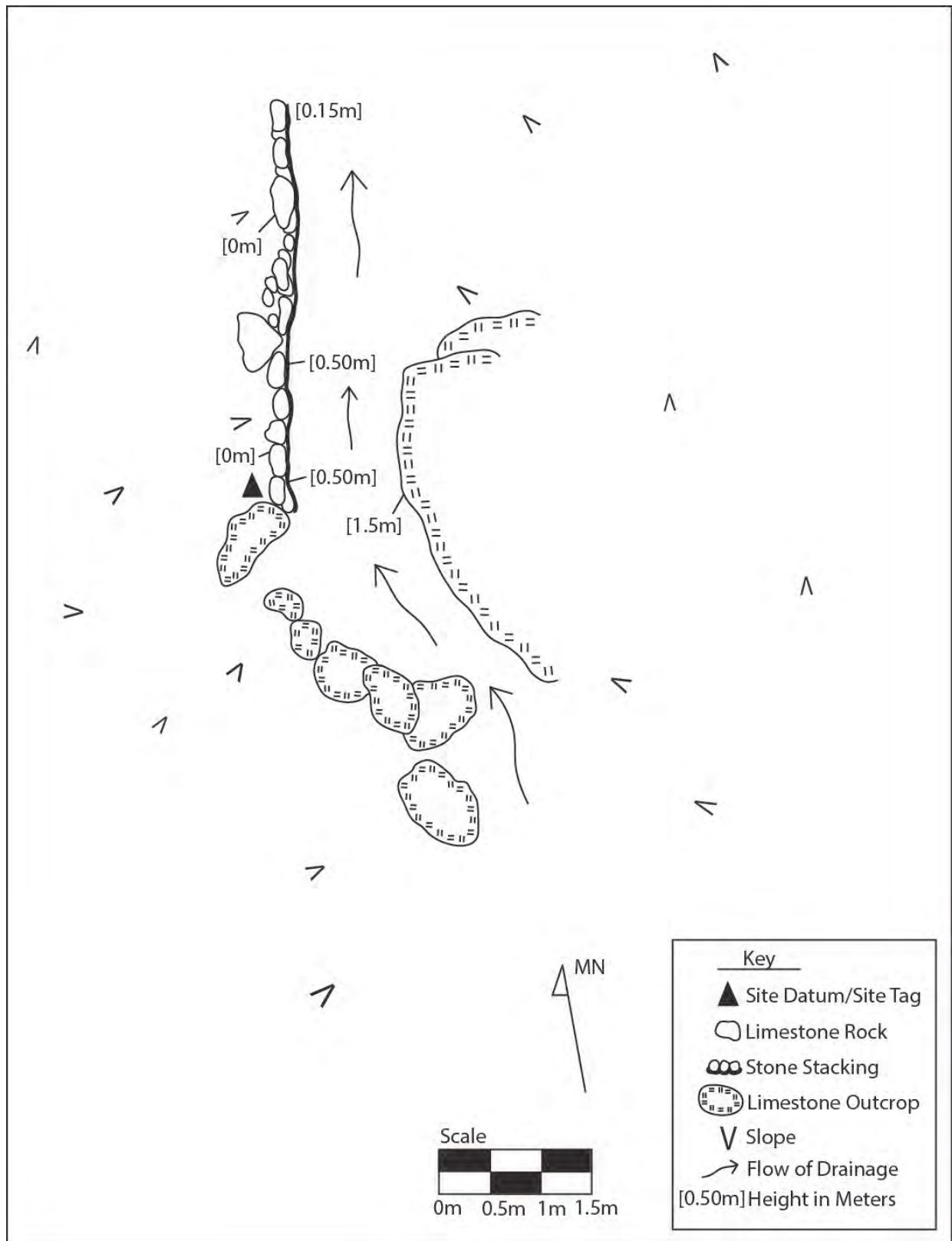
Site Function: Water Control

Site Condition: Fair

Description: Site T-043 consists of a stone-lined drainage located at the base of a limestone ridge in the north-central portion of the project area. Vegetation in the area includes *hau*, rubber tree, mango, *koa haole* and *ti*. The drainage appears natural in origin, but has been modified at its base with limestone stacking along the west side. The stacking measures 4.2 meters in length by 0.15-0.5 meter in height, and is constructed of loosely stacked limestone cobbles and slabs. At the base of the slope, the drainage measures ca. 1.1 meters wide. The east side of the drainage is a soil slope. The drainage is situated ca. 10.0 meters to the south above active agricultural fields and most likely fed the fields at one time. A modern, but abandoned chicken coop is located ca. 4.0 meters to the northeast. Modern trash is scattered throughout the site and includes aluminum soda cans, plastic bags, mattress springs, corrugated sheet metal, and plastic water bottles. This site is likely historic and was used to supply water to the nearby agricultural fields. Site T-043 appears to be associated with water control related to the former commercial sugar plantation.



Site T-043, stone-lined drainage, view to west.



Planview map of Site T-043.

SIHP No.:

Field No.: T-044

Site Type: Terrace

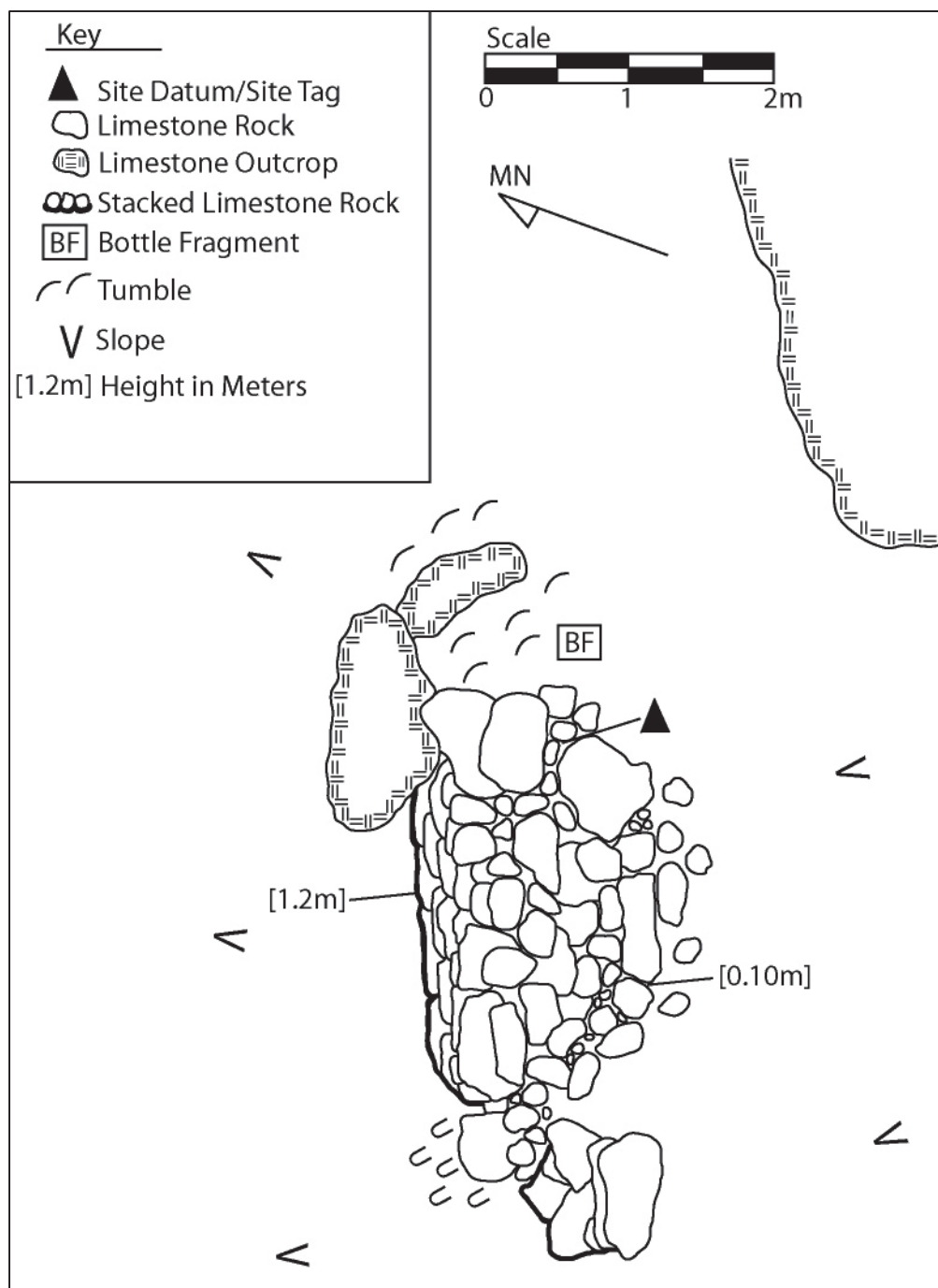
Site Function: Uncertain

Site Condition: Fair

Description: Site T-044 consists of a stone terrace located on the north side of a limestone slope. Limestone outcrops are present on both the northeast and southwest sides of the site. The terrace is constructed of limestone slabs and boulders that have been loosely stacked between five to six courses of stone in height. Several limestone outcrops are also utilized. The interior surface of the terrace consists of limestone slabs, boulders, and cobbles. The terrace is oriented roughly northeast to southwest, and measures ca. 4.1 meters in length by 1.4 meters in depth by 0.1-1.2 meters in height. Both ends of the terrace have partially tumbled down slope. An aqua glass bottle fragment was observed on the east end of the terrace, but was not collected. The bottle fragment, which measures ca. 8.0 centimeters in length by 8.0 centimeters in width, is likely a secondarily deposited artifact from the above hillside. There is abundant trash and debris in the surrounding area. Site T-044 was likely constructed during the pre-Contact period, but the specific function is uncertain.



Site T-044, terrace, view to southwest.



SIHP No.:

Field No.: T-046

Site Type: Terrace

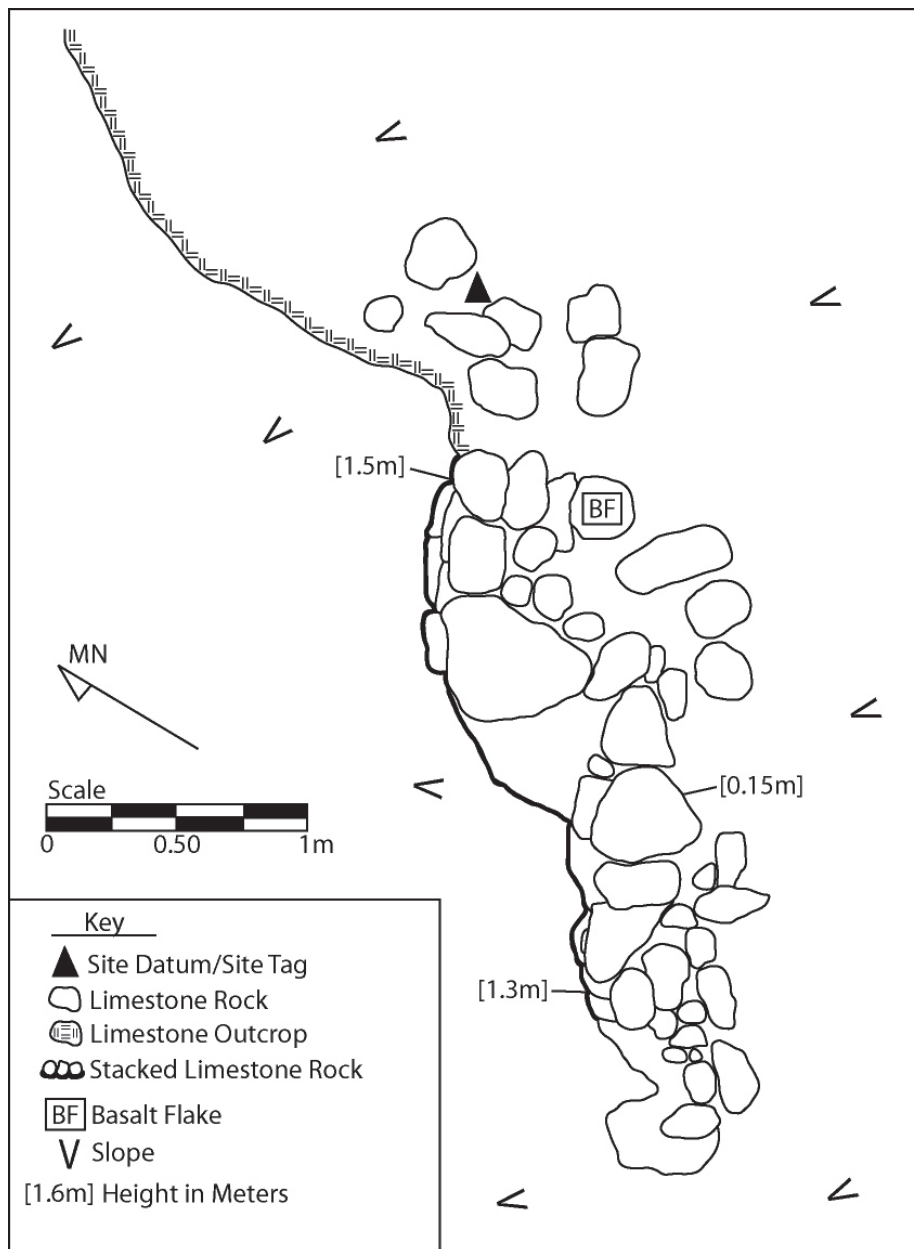
Site Function: Agriculture

Site Condition: Fair

Description: Site T-046 consists of a single limestone terrace located along a ridgeline in the central portion of the project area, ca. 12.0 meters south of Site T-047. The terrace is oriented roughly northeast to southwest on a fairly steep northwest facing slope. It is constructed of loosely stacked limestone cobbles, boulders, and slabs. Some of the slabs have been placed vertically on end. Portions of the terrace are constructed on top of an exposed limestone outcrop. The surface of the terrace consists of an area of soil that blends into the slope of the hillside. The terrace measures ca. 4.0 meters in length by 1.25 meters deep by 0.15-1.5 meters in height. An area of disturbed bulldozer push is located ca. 15.0 meters to the east of the terrace. A large basalt flake measuring ca. 14.0 centimeters by 11.0 centimeters was observed on the northeast portion of the terrace, but was not collected. Site T-046 appears to have been constructed and utilized during the pre-Contact period for agricultural purposes.



Site T-046, terrace, view to southeast.



Planview map of Site T-046.

SIHP No.:

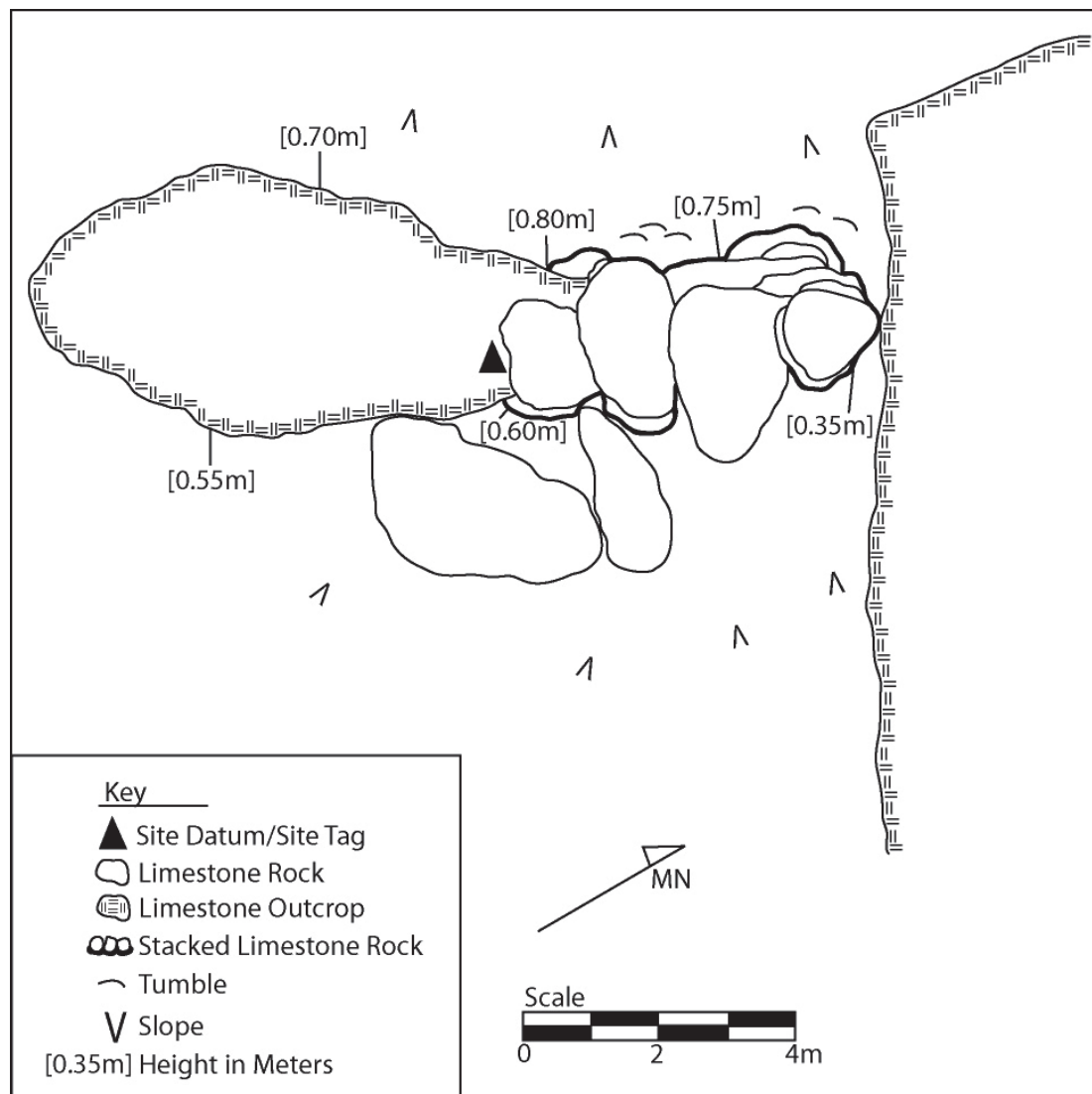
Field No.: T-047

Site Type: Terrace

Site Function: Agriculture

Site Condition: Fair

Description: Site T-047 consists of a single terrace located near the top of the limestone cliff, ca. 4.0 meters south of Site T-048. The terrace measures ca. 2.4 meters in length by 1.0 meter deep by 0.35-0.80 meter in height. The terrace is constructed of limestone slabs, boulders, and cobbles that have been loosely stacked in between two large limestone outcrops. Some of the stones have tumble down slope. The interior surface of the terrace consists of an area sloping soil. Approximately 2.0 meters to the south of the terrace is a possible modified outcrop. Site T-047 appears to have been constructed and utilized during the pre-Contact period for agricultural purposes.



Planview map of Site T-047.



Site T-047, terrace, view to east.

SIHP No.:

Field No.: T-048

Site Type: Wall

Site Function: Uncertain

Site Condition: Fair

Description: Site T-048 consists of a limestone wall located in the central portion of the project area, in between Site T-047 and Site T-062. The wall is situated along the north side of a limestone cliff. The wall is constructed of loosely stacked limestone slabs, boulders, and cobbles. Some of the slabs have been placed vertically on end. The wall is oriented roughly northwest to southeast and measures ca. 4.9 meters in length by 0.9 meter in width by 0.5 meter in height. Site T-048 was likely constructed during the pre-Contact period, but the specific function is uncertain.



Site T-048, wall, view to east.

SIHP No.:

Field No.: T-049

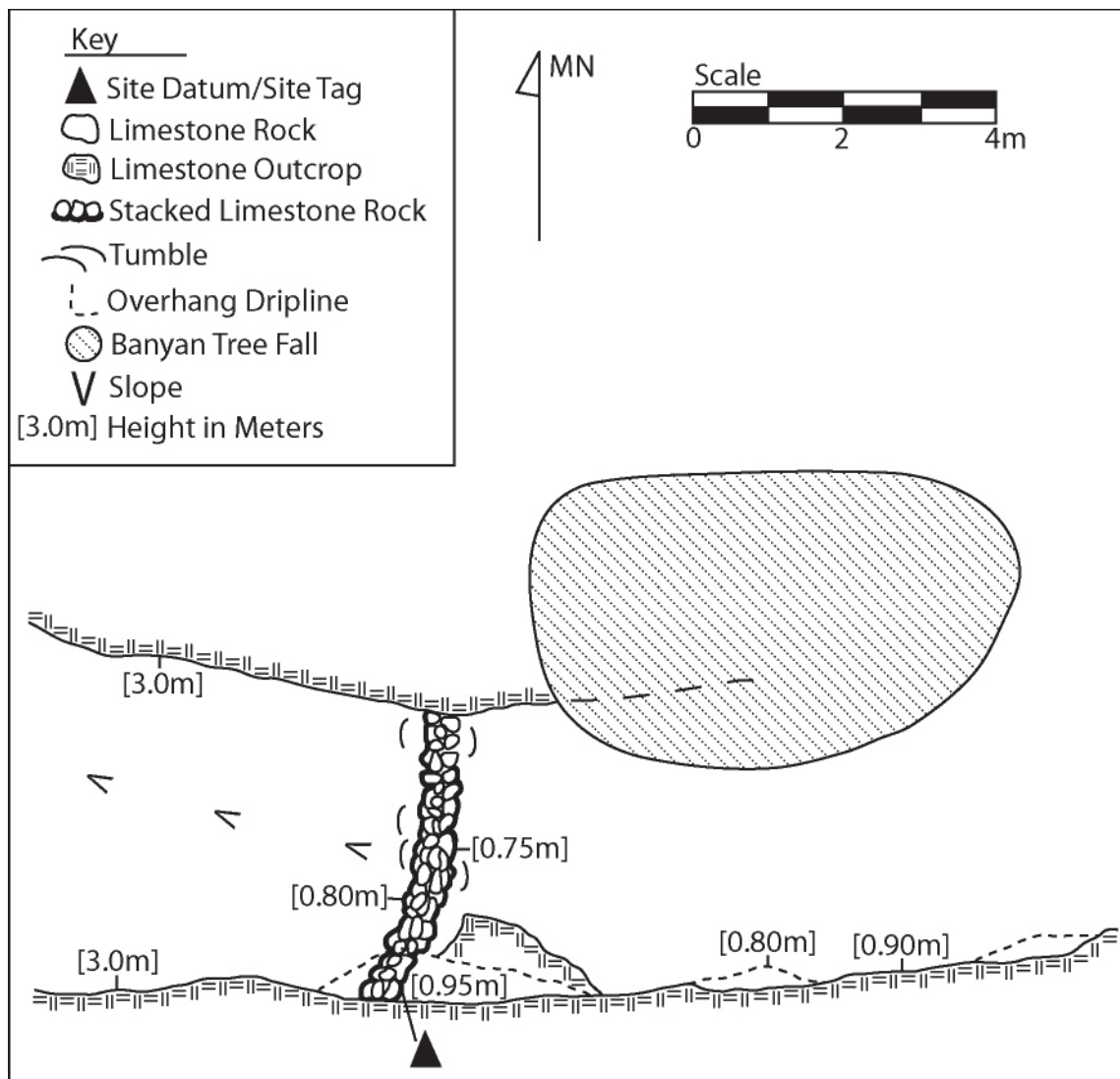
Site Type: Wall

Site Function: Habitation

Site Condition: Fair

Description: Site T-049 consists of a limestone wall located in the north-central portion of the project area, situated at the top of a limestone ridge. The wall is oriented roughly north to south and is constructed of small to large limestone slabs and boulders which have been loosely stacked between one to four courses of stone in height in between two natural limestone outcrops. The limestone outcrop to the south forms a small overhang at the south end of the wall. The wall measures ca. 3.8 meters in length by 0.9 meter in width by 0.8 meter in height along the western edge and 0.75 meter in height along the eastern edge. The small overhang measures ca. 2.5 meters in length by 1.3 meters deep by 1.0 meter in interior height. The ground surface underneath the overhang consists of soil and loose limestone cobbles. The southern end of the wall is well preserved, but the northern end is partially tumbled. No cultural material was observed at Site T-049, except for one modern plastic water bottle.

The wall runs in between the two natural limestone outcrops, blocking access to the small overhang from the west. The south end of the wall helps to form a small protected area to the east, underneath the small overhang. Although no cultural material was observed, it appears likely that the soil area underneath the overhang and directly east of the wall was utilized as a small protected shelter. There is a large accumulation of soil, tree fall, and debris on the ground surface. Site T-049 appears to have been constructed and utilized during the pre-Contact period for temporary habitation.



Planview map of Site T-049.



Site T-049, wall, view to west.



Site T-049, wall at overhang, view to south.

SIHP No.:

Field No.: T-050

Site Type: Wall

Site Function: Uncertain

Site Condition: Fair

Description: Site T-050 consists of a limestone wall located in the north-central portion of the project area, situated along a limestone ridge. The wall is oriented roughly east to west and is constructed of limestone boulder slabs that have been loosely stacked both vertically and horizontally. A few of the limestone slabs are very large in size measuring ca. 0.9 meter in length by 0.9 meter in width by 0.2 meter in thickness. Overall the wall measures ca. 50.0 meters in length by 0.7 meter in width by 0.6 meter in height. In several places the wall is overgrown with large banyan trees. The area contains numerous limestone outcrops, some of which are parallel to the slope, forming natural channel-like features. No cultural material was found in the immediate vicinity of the site. Site T-050 was likely constructed during the pre-Contact period, but the specific function is uncertain.



Site T-050, wall, view to northeast.

SIHP No.:

Field No.: T-051

Site Type: Overhang Shelter

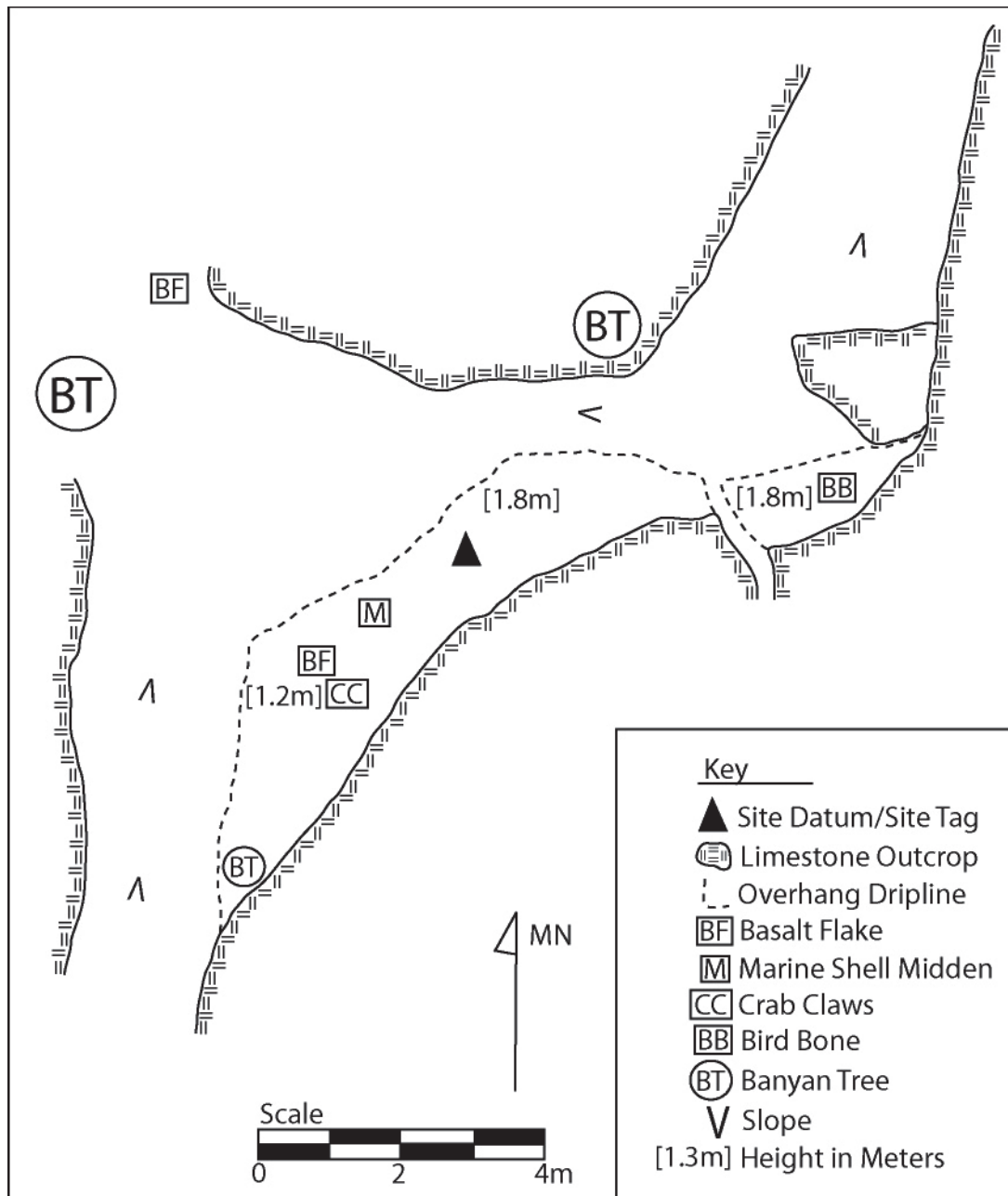
Site Function: Habitation

Site Condition: Fair

Description: Site T-051 consists of a limestone overhang shelter located along a northwest facing limestone cliff in the north-central portion of the project area. The limestone cliff measures ca 2.5 meters in height. The surrounding vegetation includes several banyan trees, and the ground slopes gently to the northwest. The interior of the overhang measures ca. 11.0 meters in length by 2.2 meters in depth with a maximum interior height of 1.8 meters. The overhang, which faces northwest, is flanked by limestone outcrops on three sides. The outcrops range in height from ca. 0.9-2.20 meters in height. Traditional cultural material was observed at Site T-051, most of which was located within the southwestern portion of the overhang. Cultural material included marine shell midden, crab claws, *kukui* nut shell fragments, and charcoal flecking. Fragments of bird bone were observed in the northeastern portion of the overhang. Several basalt flakes were also observed within the overhang, and one basalt flake was encountered ca. 5.0 meters to the northwest of the shelter. No artifacts were collected. Site T-051 appears to have been utilized during the pre-Contact period for habitation.



Site T-051, overhang shelter, view to northeast.



Planview map of Site T-051.

SIHP No.:

Field No.: T-052

Site Type: Wall

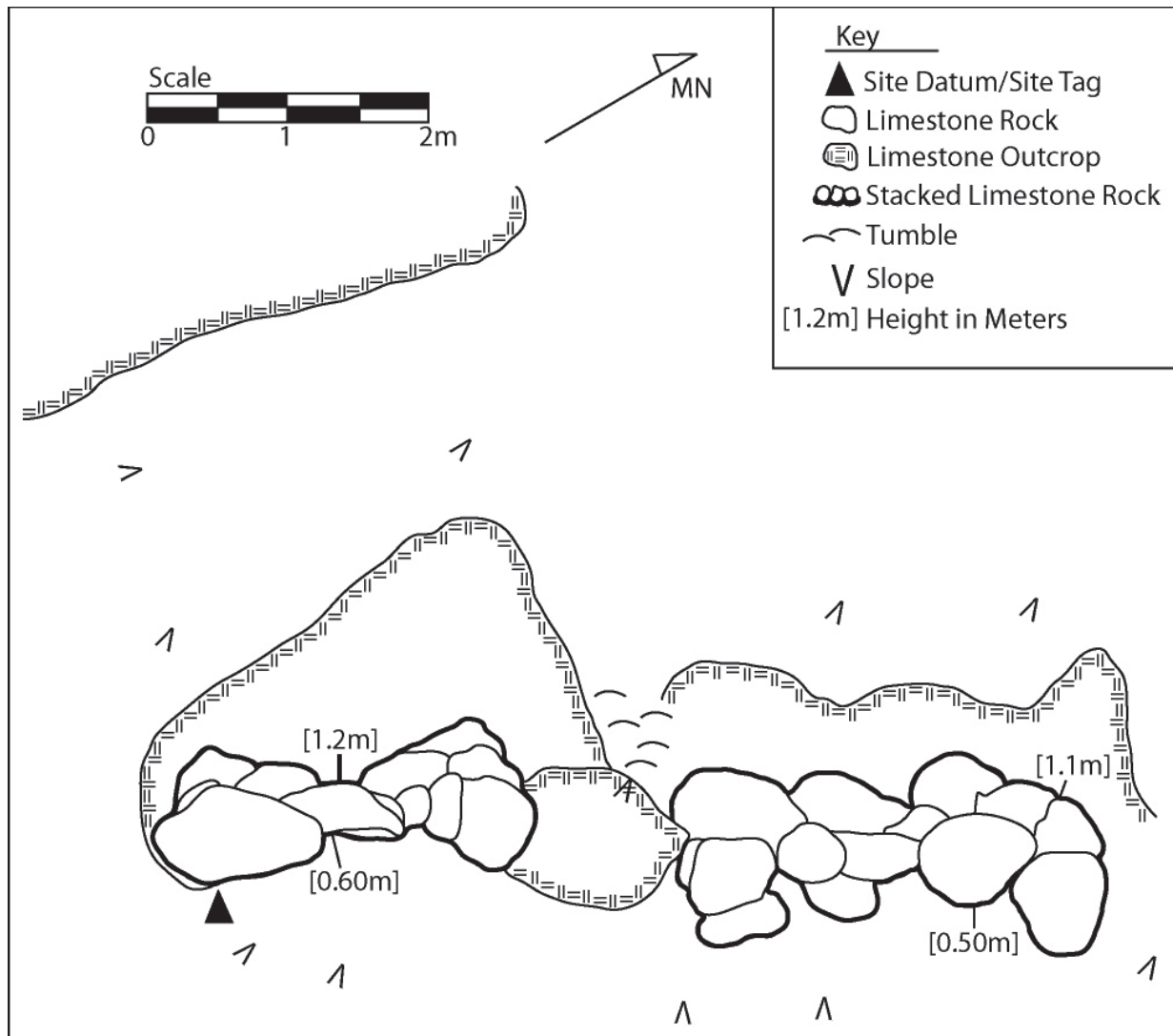
Site Function: Uncertain

Site Condition: Fair

Description: Site T-052 consists of a limestone wall located along a limestone slope in the north-central portion of the project area. The wall is situated directly upslope to the east of a natural limestone channel. The wall is constructed of limestone slabs, boulders, and cobbles that have been loosely stacked between three to five courses of stone in height on top of several exposed limestone outcrops. Overall, the wall measures ca. 7.0 meters in length, although there is a small gap located in the central portion of the wall that measures ca. 0.8 meter in length. The northeastern wall segment measures ca. 3.2 meters in length by 0.75 meter in width by 0.5-1.1 meters in height. The southwestern wall segment measures ca. 2.3 meters in length by 0.5 meter in width by 0.6-1.1 meters in height. Several stones have tumbled down slope from the central portion of the wall, which may explain the small gap. Site T-052 was likely constructed during the pre-Contact period, but the specific function is uncertain.



Site T-052, wall, view to southeast.



Planview map of Site T-052.

SIHP No.:

Field No.: T-053

Site Type: Reservoir

Site Function: Water Control

Site Condition: Fair

Description: Site T-053 consists of a small reservoir located on the south-central boundary of the APE. The reservoir is a roughly circular soil depression measuring ca. 85.0 meters in length by 55.0 meters in width by 5.0 meters in depth. Site T-011 is located on the edge of Site T-053. The reservoir extends outside of the APE for an undetermined distance. The site is covered with buffalo grass and *koa haole* trees. Active farms abut the reservoir on the north and west sides. Recent trash associated with the farmers is scattered throughout the area. This reservoir is one of two located in the area. The second reservoir is located directly adjacent to Site T-053, but is outside the current project area to the south and was not recorded. Site T-053 appears to be associated with water control related to the former commercial sugar plantation.



Site T-053, reservoir, view to southeast.

SIHP No.:

Field No.: T-054

Site Type: Concrete Ditch

Site Function: Water Transport

Site Condition: Fair

Description: Site T-054 consists of a concrete ditch located in the north-central portion of the project area. The ditch meanders around the contours of the slope in a roughly east-southeast direction and is constructed of formed concrete along the interior and limestone cobbles concreted into place along the exterior. Overall, the ditch measures ca. 65.0 meters in length by 0.61 meter in width on the exterior by 0.3 meter in width on the interior by 0.3 meter in depth. There are two “Y” branches extending off of the main ditch. These branches only measure ca. 1.0 meter in length before terminating. Two historic glass bottles were observed near the west end of the ditch. The first bottle is a machine made clear glass bottle manufactured by Owens-Illinois Glass Company in 1959. The second bottle is a mouth blown aqua glass bottle neck and finish fragment that was manufactured using a turn mold. Neither artifact was collected. Site T-054 appears to be associated with water transport related to the former commercial sugar plantation.



Site T-054, concrete ditch, view west.



Site T-054, clear glass bottle.



Site T-054, aqua glass bottle fragment.

SIHP No.:

Field No.: T-055

Site Type: Concrete Ditch

Site Function: Water Transport

Site Condition: Fair

Description: Site T-055 consists of a concrete ditch located in the north-central portion of the project area. The ditch is oriented in a roughly east to west direction, but meanders around the contour of the slope. The ditch is constructed of formed concrete along the interior and limestone cobbles concreted into place along the exterior. There are numerous off-shoots from the main ditch extending down slope to the north. The west end of the ditch consists of a Y-shaped intersection that fed into what maybe the remnants of a soil ditch. The east end of the ditch has been impacted by bulldozing, but continues after a ca. 5.8 meter break. Overall, the ditch measures ca. 100.0 meters in length by 0.95 meter in width (exterior) by 0.36 meter in width (interior) by 0.34 meter in depth (interior) by 0.25 meter in height (exterior).

Other ditches and an iron pipeline (Site T-057) are located in the vicinity. An off-shoot appears to have fed water into a limestone ditch (Site T-065) which was used to dispense the water further down slope. Site T-055 continues east and actually dives under Site T-057 (iron pipeline) then turns south, east, then south again. A metal gate and a release valve are located at the intersection of Site T-057 and Site T-055, which appears to have controlled the flow of the pipeline into the ditch. This segment of Site T-055 extends south almost out of the project area. It terminates ca. 12.0 meters north of the southern project boundary. A "Jan. 10, 1929" date is inscribed at the intersection of Site T-055 and Site T-057. Site T-055 appears to be associated with water transport related to the former commercial sugar plantation.



Site T-055, inscribed date of "Jan. 10, 1929", view to east.



Site T-055, concrete ditch intersection, view to southeast.

SIHP No.:

Field No.: T-056

Site Type: Limestone Ditch

Site Function: Water Transport

Site Condition: Poor

Description: Site T-056 consists of a limestone ditch located in the northern portion of the project area. The ditch is constructed of a cut limestone outcrop and loosely stacked limestone slabs and cobbles. Large portions of the ditch are highly degraded and overgrown with vegetation. Where intact, the ditch measures ca. 0.4-0.5 meter in width by 0.2-0.3 meter in depth. The ditch walls measure ca. 0.15-0.4 meter in thickness. The ditch forks ca. 4.0 meters northeast of the southwest end, with one ditch extending to the north for ca. 29.0 meters. The other ditch extends to the east for ca. 48.0 meters, at which point it splits again, extending an additional 29.0 meters to the east and 69.0 meters to the west. Near the initial split, there are two concrete slabs situated opposite each other with a small slot where a metal gate would have been. This gate would be used to control the flow of water into this portion of the ditch. On one of the concrete slabs, the phrase “No 3” has been carved into the surface. Site T-056 appears to be associated with water transport related to the former commercial sugar plantation.



Site T-056, limestone ditch, view to southwest.

SIHP No.:

Field No.: T-057

Site Type: Iron Pipeline

Site Function: Water Transport

Site Condition: Fair

Description: Site T-057 consists of a cast-iron pipeline located in the north-central portion of the project area, on the southeast side of a nearby dirt access road. The pipeline is oriented roughly northeast to southwest and measures ca. 136.0 meters in length by 0.28 meter diameter. The southwest end of the pipeline ties directly into the Site T-059, concrete ditch. It appears that water would flow from Site T-059 into Site T-057, which flows down slope to the north. At one point, Site T-057 crosses over the Site T-055, concrete ditch, where a valve with a circular wheel could control the flow of water into Site T-055. Site T-057 then continues down slope to the north, where it dives underground. Segments of the pipeline are supported by concrete footings as well as concrete and possibly wooden footings, although there are no remnants of the wooden supports. Site T-057 appears to be associated with water transport related to the former commercial sugar plantation.



Site T-057, iron pipeline, view to southwest.

SIHP No.:

Field No.: Site T-059

Site Type: Concrete Ditch

Site Function: Water Transport

Site Condition: Fair

Description: Site T-059 consists of a concrete ditch located in the northern portion of the project area. The ditch is constructed of formed concrete along the interior and limestone cobbles concreted into place along the exterior. The main portion of the ditch measures ca. 0.8 meter in width by 0.55 meter in depth with walls that are 0.1 meter thick. The depth of the ditch decreases to ca. 0.4 meter, while wall thickness increases to 0.25 meter, although the overall width remains at 0.8 meter, as ditch continues in a southwesterly direction. The northeast end of Site T-059 connects to the Site T-057, iron pipeline. Approximately 13.0 m southwest of the connection with T-057, there is significant damage to the ditch, likely caused by bulldozer activity in the area. Approximately 17.3 meters southwest of the intersection with Site T-057 is a fork in the ditch. One branch extends in a southeasterly direction for ca. 45.0 meters before terminating at a bulldozer push-pile. Approximately 4.0 meters past the fork, this branch of the ditch reduces to 0.3 meter in height by 0.6 meter in width with walls 0.15 meter thick. The second branch extends west and terminates after ca. 52.0 meters, measuring ca. 0.8 meter in width by 0.1 meter in depth with walls 0.25 meter thick. Site T-059 appears to be associated with water transport related to the former commercial sugar plantation.



Site T-059, concrete ditch, view to west.



Site T-059, concrete ditch, view to west.

SIHP No.:

Field No.: T-060

Site Type: Concrete Ditch

Site Function: Water Transport

Site Condition: Poor

Description: Site T-060 consists of a concrete ditch located in the north-central portion of the project area. The ditch is oriented roughly northwest to southeast and is constructed of pre-formed concrete sections that are fitted together and sealed with a tar-like substance. Overall, the ditch measures ca. 19.0 meters in length by 0.47 meter in width by 0.28 meter in depth. The southern end of the ditch has been impacted by a bulldozer, possibly when a nearby access road was constructed. There is a Y-shaped intersection on the south end of the ditch with rock and soil debris pushed into it. The north end is much narrower measuring only ca. 0.29 meter in width by 0.16 meter in depth. Each concrete piece measures ca. 0.88 meter in length. Every other segment contains small openings on each side measuring 0.09 meter in width by 0.12 meter in height. Several openings contain a small metal door that likely blocked or allowed water to flow out of the openings. Presumably all of the openings had doors, but most are now missing. The Y-shaped branch on the south end is oriented to the northeast and measures ca. 2.0 meters in length. The rest of this branch has been destroyed by bulldozing. On the exterior of the intersection is a small pile of limestone cobbles placed in order to reinforce the intersection. Site T-060 appears to be associated with water transport related to the former commercial sugar plantation.



Site T-060, concrete ditch, view to southwest.

SIHP No.:

Field No.: T-061

Site Type: Complex

Site Function: Water Control/Transport

Site Condition: Fair

Description: Site T-061 is a complex comprised of four associated features located approximately 4.5 meters southeast of the dirt access road which serves as the main access road for the zip line. The entire site is surrounded by a chain link fence with a locked gate located on the northwest side.

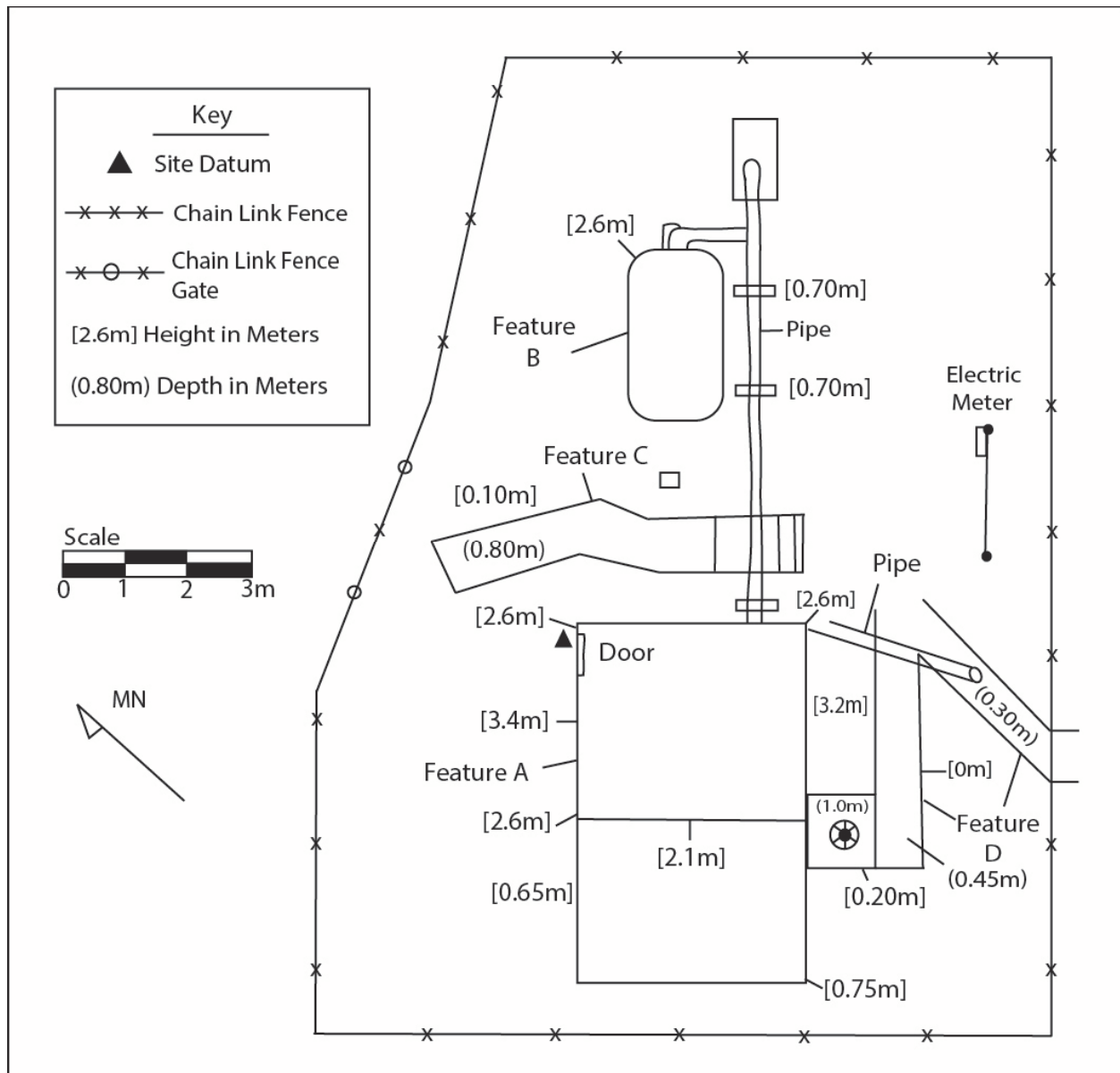
Feature A consists of a pump house located in the western portion of Site T-061. The structure measures ca. 3.5 meters in length by 3.0 meters in width by 3.4 meters in total height. The structure is wood plank and plywood constructed on top of a concrete foundation. A door and two small stairs are located at the northern corner of the structure. On the south side of the structure is a concrete footing covered with plywood and roofing material. The footing measures ca. 3.5 meters in length by 2.5 meters in width by 0.6 meter in height. The footing appears to be hollow inside. Inside the structure, there are two electrical boxes on the northwest facing wall and a metal pipe coming up through the floor boards which exits through the northeast facing wall and runs to the Feature B, tank. Feature A appears to be associated with water control related to the former commercial sugar plantation.

Feature B is a metal tank located at the northeast side of Site T-061. The tank measures ca. 1.2 meters in diameter and is sitting on top of two concrete slabs ca. 1.0 meter above the ground. A metal pipe measuring ca. 0.2 meter in diameter extends out of the northeast side of the tank and then turns and runs at ca. 0.7 meters above the ground surface southwest towards the northeast wall of the Feature A, pump house. The pipe is supported by several concrete slabs. Feature B appears to be associated with water control related to the former commercial sugar plantation.

Feature C consists of a concrete ditch located in between Feature A and Feature B. The ditch is oriented roughly northeast to southwest and measures ca. 5.5 meters in length by 1.0 meter in width by 1.0 meter in maximum depth. The walls of the concrete ditch measure ca. 0.25 meter in thickness. The southeast end of the ditch is filled with soil. Feature C appears to be associated with water transport related to the former commercial sugar plantation.

Feature D is a concrete ditch located immediately south of the Feature A, pump house. The ditch runs northeast to southwest for ca. 4.0 meters along the southeast side of Feature A, then turns abruptly and runs north to south and continues under the chain link fence that encompasses the site. The ditch measures ca. 0.9 meter in width by 0.3 meter in depth. The walls of the ditch measure ca. 0.15 meter in thickness. Feature D appears to be associated with water transport related to the former commercial sugar plantation.

Site T-061 appears to be associated with water control and transport related to the former commercial sugar plantation and appears to still partially be in use today. An active electrical meter is located along the southeast side of the site.



Planview map of Site T-061, pump house.



Site T-061, Fe. A, pump house, view to east.



Site T-061, Fe. B, tank, view to east.

SIHP No.:

Field No.: T-062

Site Type: Overhang Shelter with Terraces

Site Function: Habitation

Site Condition: Fair

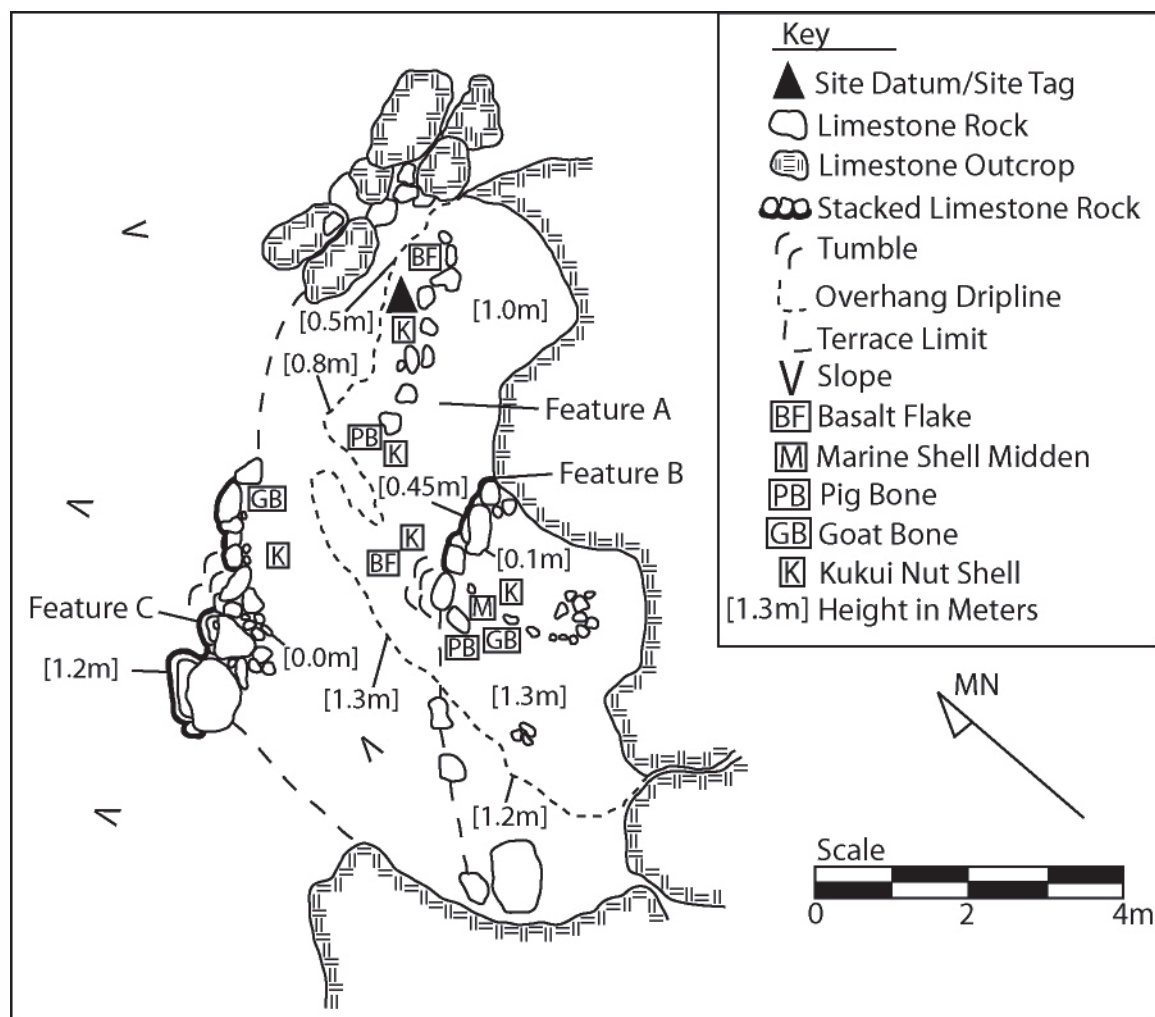
Description: Site T-062 is comprised of an overhang shelter with two associated terraces located in the north-central portion of the project area, ca. 8.0 meters north of Site T-048. The site is situated along the northwest side of a large limestone outcrop located near a series of fallow agricultural fields to the northwest. The site consists of an overhang shelter (Feature A) with an internal terrace (Feature B) and an exterior terrace (Feature C).

Feature A consists of a limestone overhang shelter located along the northwest side of a limestone cliff face. The interior of the overhang measures ca. 8.0 meters in length by 3.5 meters in depth by 1.3 meters height. The interior surface of the overhang consists mostly of soil with some scattered limestone boulders and cobbles. The Feature B, terrace, is also located within the overhang. Traditional cultural material including fragments of *kukui* nut shell, sea urchin, and two basalt flakes was observed on the surface of the interior of the overhang. The larger of the two basalt flakes is located at the east end of the overhang and measures ca. 11.2 centimeters in length by 10.4 centimeters in width by 5.0 centimeters in thickness. It has a prominent striking platform and bulb of percussion, with multiple flake scars visible on the dorsal surface. The second flake is located in the central portion of the overhang and measures ca. 3.0 centimeters in length by 2.5 centimeters in width by 0.4 centimeters in thickness. It is snapped in half and exhibits a prominent striking platform, but no bulb of percussion. Several fragments of non-human medium mammal bone, likely pig and goat, were also observed within the overhang. Feature A appears to have functioned as a traditional habitation shelter.

Feature B consists of a soil terrace with stone retaining wall located within the central-western portion of the Feature A, overhang. The terrace measures ca. 1.9 meters in length by 2.0 meters in depth by 0.1-0.45 meters in height. The stone retaining wall is constructed of limestone boulder and cobble slabs that have been loosely stacked between two to three courses of stone in height. Some of the stones forming the retaining wall have tumbled outward. The surface of the terrace consists of soil with several loose limestone boulders and cobbles. Traditional cultural material including fragments of *kukui* nut shell and marine shell midden was observed on the surface of the terrace. Several fragments of non-human medium mammal bone, likely pig and goat, were also observed on the terrace. Feature B appears to have functioned as a traditional habitation terrace.

Feature C consists of a soil terrace with stone retaining wall located just outside of the Feature A, overhang drip line. The terrace measures ca. 3.6 meters in length by 2.3 meters in depth by 0.0-1.2 meters in height. The stone retaining wall is constructed of limestone boulder slabs and cobbles that have been loosely stacked between two to four courses of stone in height. Some of the stones forming the retaining wall have tumbled outward. Fragments of *kukui* nut shell and non-human medium mammal bone, likely goat, were also observed on the terrace. Feature C appears to have functioned as a traditional habitation terrace.

Site T-062 appears to have functioned as traditional habitation site.



Planview map of Site T-062.



Site T-062, overview, view to south.



Site T-062, Fe. A, overhang shelter, view to south.



Site T-062, Fe. B, terrace, view to south.



Site T-062, Fe. C, terrace, view to southwest.

SIHP No.:

Field No.: T-063

Site Type: Cave with Terrace

Site Function: Habitation

Site Condition: Good

Description: Site T-063 consists of a limestone cave (Feature A) with an interior terrace (Feature B) located in the north-central portion of the project area. The site is situated along the north side of a limestone cliff face. There is a dirt access road located ca. 10.0 meters upslope to the south of the cave entrance, and one of the zip line runs is located ca. 5.0 meters to the north. Near the center of the entrance to the cave is a large debris pile of modern trash measuring ca. 5.0 meters in length by 4.0 meters in width. It consists of plastic trash bags with aluminum cans, plastic gallon jugs, a TV, refrigerator, miscellaneous metal fragments, car parts, etc. The trash appears to have been dumped into the site from slope above the entrance. The hillside above the cave entrance is also littered with modern trash.

Feature A consists of a large limestone cave. The entrance to the cave is also large and faces to the north, measuring ca. 19.0 meters in length by 3.2 meters in maximum height. The interior of Feature A measures ca. 30.0 meters (east-west) by 20.0 meters (north-south) by 3.2 meters in maximum height. The interior of the cave consists of limestone outcrops, loose limestone boulders, and relatively flat areas of accumulated soil.

The largest areas of soil are located in the eastern portion of the cave. The main area of occupation is located in the center of the eastern portion of the cave and consists of a relatively flat, cleared area of soil that is demarcated by large limestone boulders and limestone outcrops that form a natural terrace-like area. This area measures ca. 6.0 meters in length by 3.0 meters in width with an interior ceiling height of ca. 2.4 meters. The west edge of this area abuts the modern trash pile located at the drip line of the cave. The surface of this area is covered with fine ash-like soil, and likely contained one or several hearths, although there is no evidence of any on the surface. Fragments of charcoal, *kukui* nut shell, and marine shell midden are visible on the surface.

Immediately to the south of the main living area is a natural ledge that drops ca. 1.1 meters. This ledge is appears to be natural, but does contains a fair amount of soil with several loose limestone boulders. It measures ca. 6.8 meters in length by 2.5 meters in width with an interior ceiling height of 2.7 meters. Fragments of charcoal, *kukui* nut shell, and marine shell midden was observed on the surface of this ledge.

Located immediately to the south of this ledge, and situated at the southern most point of the cave, is the lowest internal area which appears to have been created by large limestone boulder roof fall that is lodged between the ceiling and floor of the cave creating an interior chamber. This chamber measures ca. 5.0 meters in length by 4.5 meters in width with an interior ceiling height of ca. 1.4 meters. The floor of the chamber consists of limestone pebbles, cobbles, and boulders, with no soil present. Within this chamber, a variety of traditional cultural material was observed consisting of one basalt adze (Artifact 1), one limestone hammerstone (Artifact 2), at least one basalt flake, numerous unmodified basalt cobbles, as well as fragments of charcoal,

burnt *kukui* nut shell, and marine shell midden. Several other internal chambers similar to this one were observed along the southern portion of the cave.

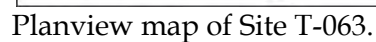
A second cleared soil area is located in the northeastern most portion of the cave, immediately north of the main area of occupation. This area measures ca. 7.5 meters in length by 6.0 meters in width with an interior ceiling height of ca. 1.7 meters. A large variety of traditional cultural material was observed on the surface of this area consisting of one basalt adze (Artifact 3), two basalt flakes, one dog tooth, fragments of non-human medium mammal bone, marine shell midden (cowrie, cone, *pipipi*), and *kukui* nut shell fragments. African land snails and smaller land snails are covering the floor. A scatter of eight modern glass beer bottles was also observed near the edge of the drip line. The Feature B, terrace, is located immediately south of this cleared area of soil.

Feature B consists of a small soil terrace with stone retaining wall located in between the two main cleared areas of soil in the eastern portion of the cave. The terrace measures ca. 2.8 meters in length by 2.0 meters in depth by 0.0-0.35 meters in height. The ceiling height at Feature B is ca. 1.3 meters. The stone retaining wall is constructed of three limestone boulders set in a line and several limestone cobbles. The terrace also utilizes several limestone outcrops to the east and set limestone boulders to the west. The surface of the terrace consists of soil with loose limestone pebbles. Traditional cultural material was observed on the surface of Feature B including fish bone, marine shell midden (cowrie, operculum, *pipipi*, crab, sea urchin), and numerous fragments of *kukui* nut shell.

The western portion of the cave contains less soil and limestone boulders. The floor surface consists of undulating sharp limestone with pockets of red silt clay soil. Numerous *kukui* nut shell fragments are present, but there is a significant lack of marine shell midden in this portion of the cave. A single shark tooth was observed on surface of this area, but did appear to be associated with any feature.

Aside from the modern trash, Site T-063 is in good condition. The area outside the cave entrance contains *koa haole* and banyan trees, and scrub vegetation. The vegetation under the adjacent zip line has been cut and appears to have been bulldozed, although it does not appear that this has had an effect on the cave site. There is evidence of people using the cave recently, including several partially burnt mosquito coils that were found tucked among the rocks on the west side of the cave, however, the cave does not appear to have been looted given the types of artifacts recovered.

Given the large size of the cave, the large variety and amount of traditional cultural material observed, and the proximity to other traditional sites in the vicinity, Site T-063 appears to have functioned as a traditional habitation site. The cave was likely well known and significant to those living in this area during the pre-Contact period. All three artifacts were collected and are presented in Section 8.0 of this report.





Site T-063, Fe. A, cave, with main soil area in foreground, view to south.



Site T-063, Fe. B, terrace, view to southeast.



Site T-063, shark tooth.

SIHP No.:

Field No.: T-064

Site Type: Concrete Ditch

Site Function: Water Transport

Site Condition: Fair

Description: Site T-064 consists of a concrete ditch located in the north-central portion of the project area, ca. 2.0 meters north of a dirt access road, 10.0 meters south of Site T-063, and 15.0 meters south of a zip line run. The ditch is oriented roughly east to west, paralleling the north side of the dirt access road along the top edge of a steep north facing slope.

The interior portion of the ditch is constructed of concrete, while the exterior portion is faced with limestone cobbles. Overall, the ditch measures ca. 25.0 meters in length by 0.85 meter in exterior width by 0.43 meter in interior width by 0.6 meter in exterior height. The east end of the ditch terminates, while the west end forms a T-shaped intersection. One branch continues north for ca. 1.8 meter before terminating. It is constructed of concrete and limestone cobbles and measures ca. 0.7 meters in exterior width and 0.26 meter in interior width by 0.2 meter in depth. The main ditch continues west, but is badly impacted and mostly destroyed.

There is a stone retaining wall located under a portion of the north side of the ditch. The retaining wall is constructed of loosely stacked limestone cobbles and measures ca. 15.0 meters in length by 0.8 meter in width by 0.4 meter in height.

Site T-064 appears to be associated with water transport related to the former commercial sugar plantation.



Site T-064, concrete ditch, view to east.

SIHP No.:

Field No.: T-065

Site Type: Limestone Ditch

Site Function: Water Transport

Site Condition: Poor

Description: Site T-065 consists of a limestone ditch located in the north-central portion of the project area. The ditch is situated directly north of, and connected to, the Site T-055, concrete ditch. Site T-065 is very rough in appearance and may be partially natural. The ditch appears to have been at least partially excavated into an exposed limestone outcrop. It is oriented roughly northwest to southeast on a northwest facing slope. The main portion of the ditch measures ca. 13.0 meters in length by 0.7 meters in width by 0.7 meter in depth. Near the base of the slope the ditch splits into three separate ditches, one continuing straight downhill to the northwest, one veering west, and one veering east. The ditch to the northwest runs for an additional 13.0 meters before terminating. The ditch to the east resembles more of a soil-like ditch. It measures ca. 21.0 meters in length by 0.9 meter in width by 0.25 meter depth and simply ends. The ditch to the west runs along the base of an exposed limestone slope for ca. 17.0 meters before terminating. The western ditch measures ca. 1.0 meter in width by 0.25 meter in depth.

Site T-065 appears to be associated with water transport related to the former commercial sugar plantation.



Site T-065, limestone ditch, view to northwest.

SIHP No.:

Field No.: T-066

Site Type: Stacked Stone Ditch

Site Function: Water Transport

Site Condition: Fair

Description: Site T-066 consists of a stacked stone ditch that runs parallel to the Site T-037, concrete ditch, ca. 1.0 meter to the north. It is constructed of basalt cobbles and boulders that have been loosely stacked up to two courses of stone in height. The ditch is oriented roughly northeast to southwest and measures ca. 23.0 meters in length by 1.3 meters in width by 0.4 meter in depth. The walls of the ditch measure ca. 0.3 meter in thickness. The northeastern end of the ditch is blocked by several basalt boulders. The southwestern end terminates at an area that appears to have been bull-dozed, similar to Site T-037. Based on the location of Site T-065, it may have connected to the Site T-034, soil ditch, at one time.

Site T-066 appears to be associated with water transport related to the former commercial sugar plantation.



Site T-066, stacked stone ditch, northwest.

SIHP No.:

Field No.: T-067

Site Type: Modified Outcrop

Site Function: Uncertain

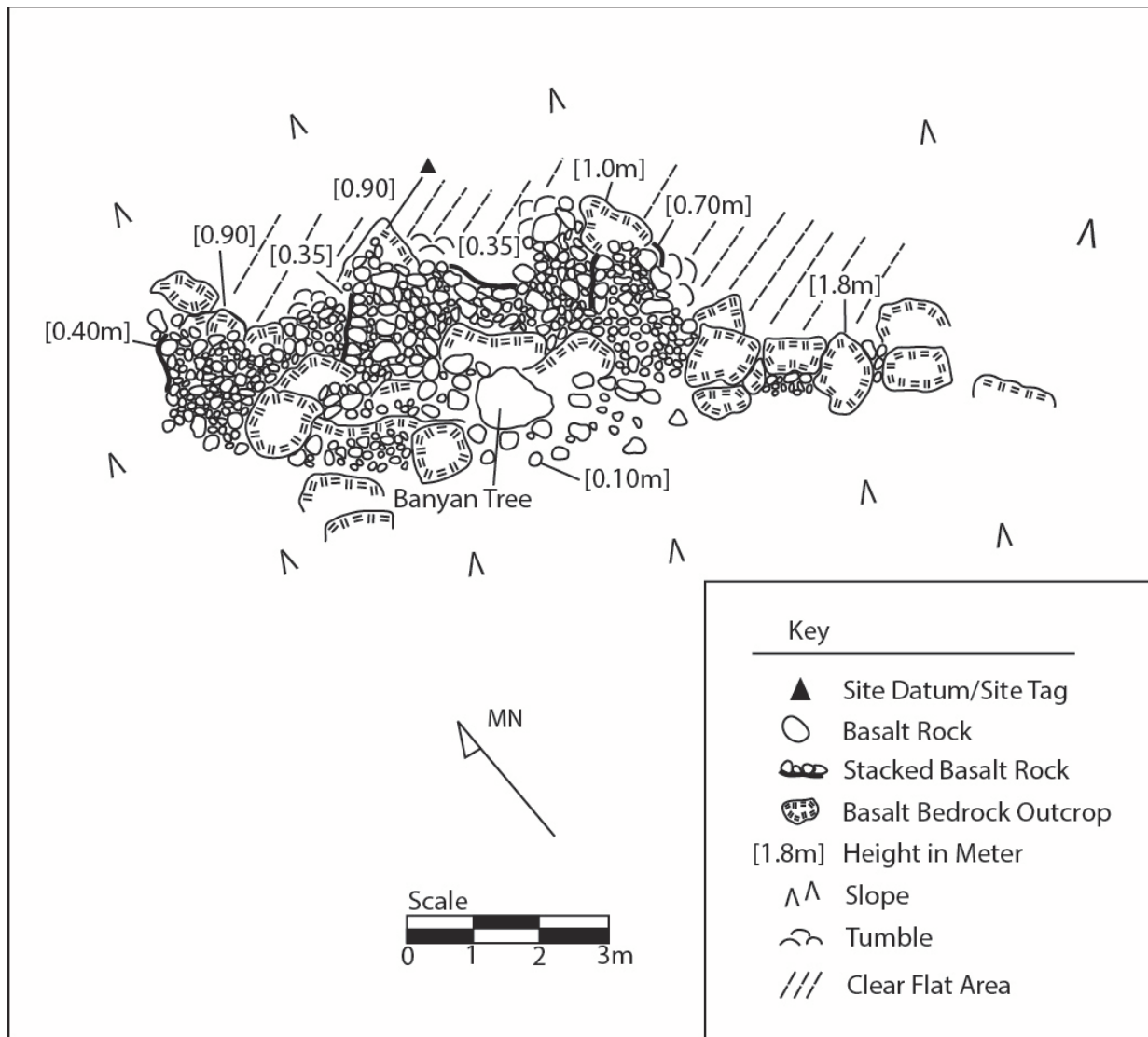
Site Condition: Poor

Description: Site T-067 consists of a single modified outcrop located within the southwest portion of the current project area, ca. 5.0 meters down slope to the north of the Site T-030, Feature C, stone retaining wall. The site is situated on a moderate to steep north facing slope, in an area of natural basalt outcrops and loose subangular basalt boulders and cobbles. The vegetation surrounding the site consists of *koa haole* trees, one banyan tree, several undetermined species of tree, as well as a ground cover of non-native grass.

Site T-067 consists of an irregularly shaped modified outcrop constructed of small subangular basalt boulders and large cobbles that have been partially piled and partially loosely stacked up to two courses of stone in height on top of several adjacent large basalt bedrock outcrops. The modified outcrop measures ca. 9.0 meters in length (northwest-southeast) by 5.0 meters in width (northeast-southwest) by 0.9 meters in height along the northeast down slope edge and 0.1 meter in height along the southwest upslope edge. There is a narrow, relatively clear, flat area located along the northeast down slope edge of the modified outcrop which measures ca. 8.0 meters in length (northwest-southeast) by 0.7-2.0 meters in width (northeast-southwest). No cultural material was observed at Site T-067.

Site T-067 is in poor condition. Some of the stone stacking and piling remains intact, however there appears to be a significant amount of stone tumble located along the northeast down slope edge. A banyan tree is growing out of the southeast-central portion of the feature which appears to have caused additional disturbance.

The function of the Site T-067, modified outcrop, is uncertain. Due to the steep slope of the area, it appears unlikely that the upslope portion of the feature was utilized as a terrace, either for habitation or agriculture. The small, relatively clear, flat area along the northeast down slope edge of the feature appears to have been the area of focus, although it is unclear whether the space was used for habitation or agriculture based on the lack of cultural material observed and the poor condition of the feature itself. The modified outcrop does appear to have been constructed and utilized during the pre-Contact period based on the style of construction.



Site T-067, modified outcrop.



Site T-067, modified outcrop, view to southwest.

SIHP No.:

Field No.: T-068

Site Type: Stone Terrace

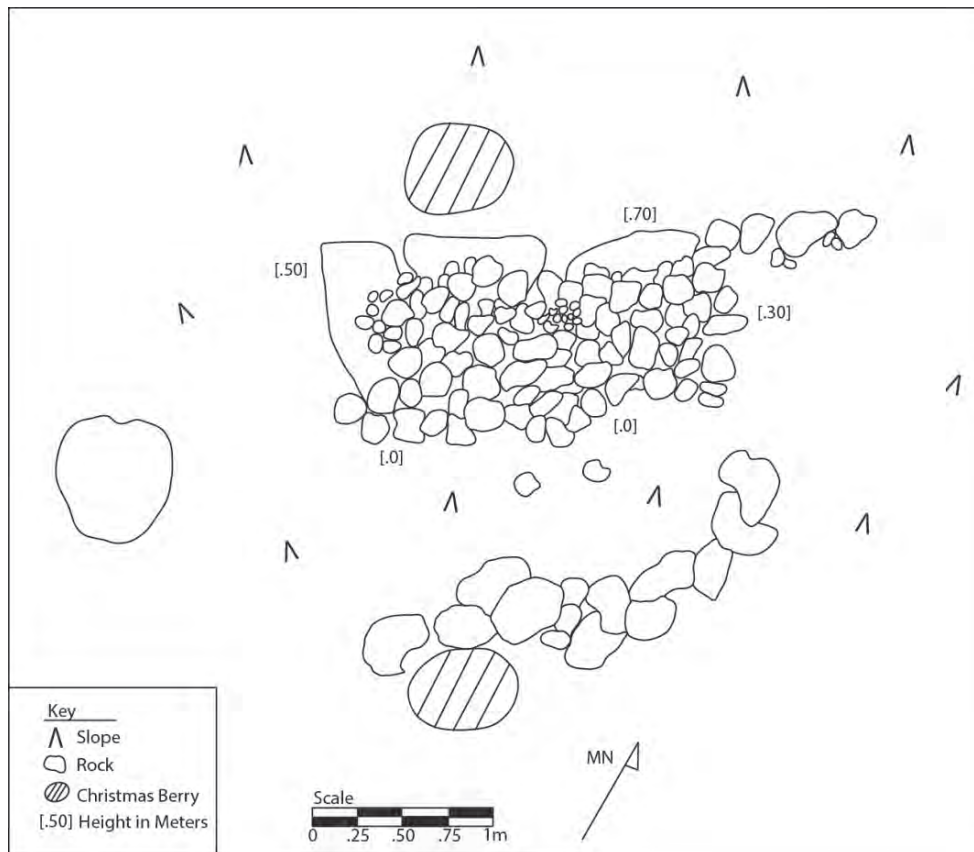
Site Function: Uncertain

Site Condition: Fair

Description: Site T-068 consists of a stone terrace located in the southwest portion of the project area, just upslope to the southeast from the Site T-030, soil ditch, and northeast of the Site T-069, terraces. The site is situated on a steep northwest facing slope. Vegetation in the area consists of rubber tree, Christmas berry, banyan, *koa haole*, guava, and *ti*. The hillside is fairly rocky with basalt pebbles, cobbles, and boulders evenly spread out. Sites in the vicinity consist of the Site T-069, traditional terraces, the Site T-030, historic soil ditch, and the Site T-070, historic artifact scatter.

Site T-068 is a single stone terrace oriented roughly northeast to southwest and measuring ca. 2.2 meters in length by 1.3 meters in depth by 0.7 meter in height. The terrace is constructed of basalt boulders on the north and southwest sides. The boulders are ca. 0.7 meter in diameter while the cobbles are ca. 0.12-0.2 meter in diameter. The interior surface of the terrace consists of piled basalt cobbles. The upslope side (southeast) of the terrace blends into the hillside. No artifacts, coral, or midden was observed at the terrace, and no human remains were present.

The function of the Site T-068 is uncertain. The terrace appears too small and rocky for habitation or agriculture. The surrounding area is too rocky for the feature to be a clearing mound, and the terrace does not resemble a burial feature. The stone terrace does appear to have been constructed and utilized during the pre-Contact period based on the style of construction.



Planview map of Site T-068, stone terrace.



Site T-068, stone terrace, view to southwest.

SIHP No.:

Field No.: T-069

Site Type: Terraces (2)

Site Function: Habitation/Agriculture

Site Condition: Good

Description: Site T-069 consists of two terraces (Feature A and B) located at the southwest edge of the current project area. The current project boundary runs through the Feature B, terrace. The site is situated on a moderate west-northwest facing slope in an area with natural basalt bedrock outcrops and scattered basalt boulders and cobbles. The vegetation surrounding the site consists of *koa haole* trees and several undetermined species of trees and shrubs, as well as a few *noni* trees, and a few stands of *ti* located down slope to the west-northwest. Overall, Site T-069 measure ca. 10.0 meters in length (northeast-southwest) by 9.0 meters in width (northwest-southeast).

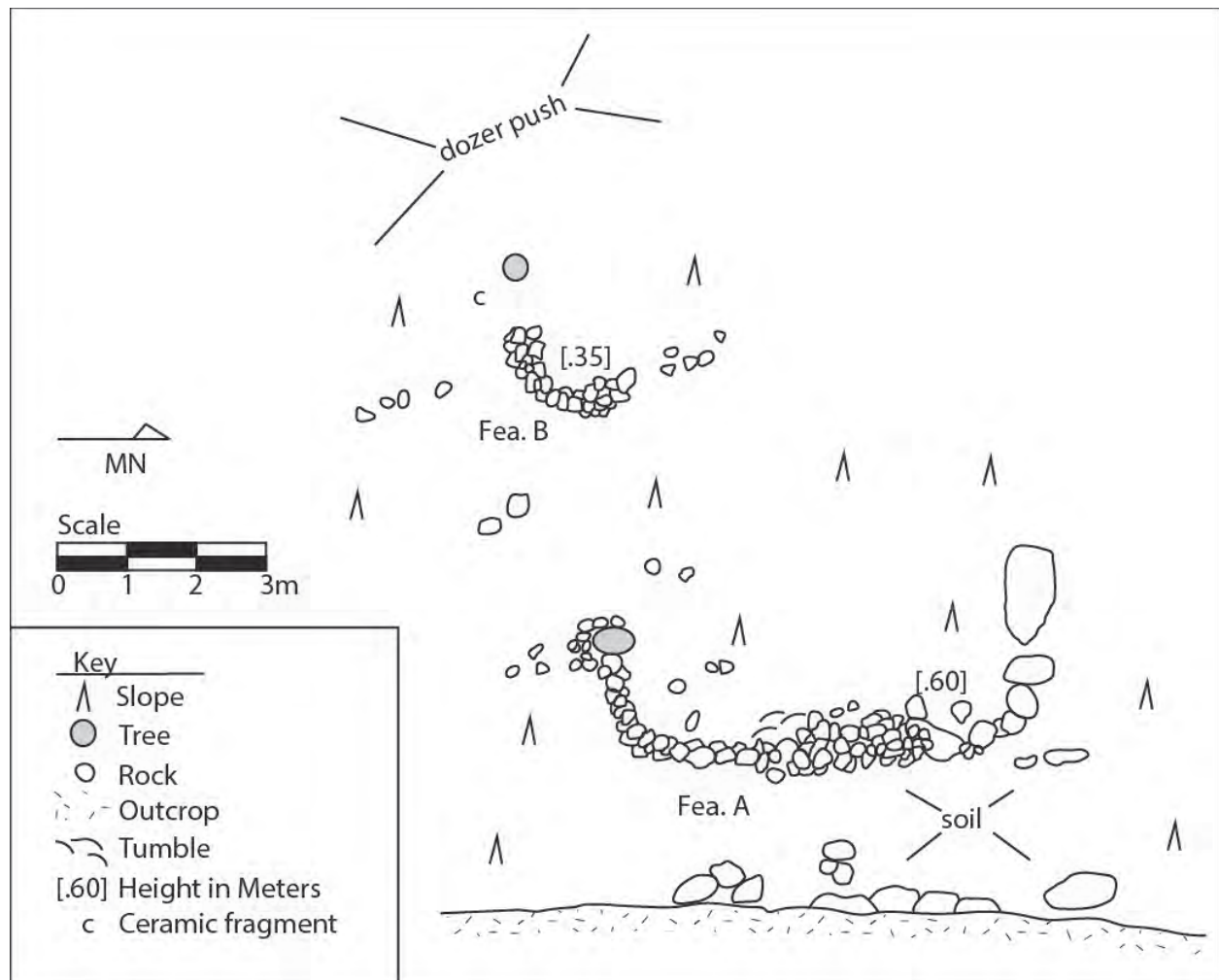
Several features are in close proximity to Site T-069. A small unrecorded stone mound (no site number) is located ca. 5.0 meters southwest of Feature B, just outside the current project boundary. A large circular depression and historic bottle/ceramic scatter (Site T-070) is located between ca. 1.0-5.0 meters northwest, west, and southwest of the site. A linear bulldozer push pile is located ca. 3.0-10.0 meters southwest of Site T-069.

Feature A consists of a roughly linear soil terrace with stone retaining wall which has been constructed near the base of a linear natural basalt outcrop. The stone retaining wall is constructed of small to medium subangular basalt boulders and large cobbles which have been loosely stacked between one to three courses of stone in height along the northwestern exterior edge. The stone retaining wall is oriented roughly northeast to southwest and curves down slope to the northwest at both ends. The retaining wall measures ca. 6.5 meters in length (northeast-southwest) by 0.3-0.8 meter in width (northwest-southeast) by 0.3-0.6 meter in height along the northwestern exterior edge and ca. 0.0-0.25 meter in height along the interior southeastern edge. The interior surface of the terrace consists of a relatively cleared, flat area of soil with a few basalt boulders at the northeast and southwest ends. The soil interior surface measures 8.0 meters in length (northeast-southwest) by 2.5 meters in width (northwest-southeast) from the stone retaining wall to the natural bedrock outcrop. Feature A appears to have function as a habitation terrace constructed and utilized during the pre-Contact period based on the style of construction and the relatively clear, flat, soil area at the base of the natural bedrock outcrop.

Feature B is located ca. 3.2 meters west of Feature A, and consists of a soil terrace with curved stone retaining wall. The retaining wall is constructed of small subangular basalt boulders and large cobbles which have been loosely stacked between one to two courses of stone in height. The wall is oriented roughly northeast to southwest and curves down slope to the northwest at both ends. The wall measures ca. 2.0 meters in length (northeast-southwest) by 0.3-0.5 meter in width (northwest-southeast) by 0.2-0.35 meter in height along the northwestern exterior edge and ca. 0.0-0.15 meter in height along the interior southeastern edge. The interior surface consists of a relatively flat area of soil with scattered basalt cobbles. The interior surface measures ca. 2.5 meters in length (northeast-southwest) by 1.5 meters in width (northwest-southeast). Feature B appears to have functioned as a small agricultural terrace constructed and

utilized during the pre-Contact period based on the style of construction, small size, and the stone wall which retains a small amount of soil on the west-northwest facing slope.

Site T-069 appears to have functioned as a traditional site constructed and utilized during the pre-Contact period. Feature A likely functioned as a habitation terrace, while Feature B likely functioned as an agricultural terrace. It is possible that the site was also utilized into the historic period based on the close proximity of nearby historic features and artifacts.



Planview map of Site T-069.



Site T-069, Fe. A, terrace, view to north.



Site T-069, Fe. A, terrace, view to south.



Site T-069, Fe. B, terrace, view to southeast.

SIHP No.:

Field No.: T-070

Site Type: Artifact Scatter

Site Function: Dump

Site Condition: Fair

Description: Site T-070 is located in the southwestern portion of the project area near the southern project boundary. The site is situated on a moderate northwest facing slope in between the Site T-030, soil ditch and the Site T-069, terraces. Vegetation in the area consists of *noni*, *ti*, Christmas berry, and guava. Site T-070 consists of a historic artifact scatter comprised of glass bottles and ceramics that covers a large area measuring ca. 28.0 meters in length (north-south) by 7.0 meters in width (east-west). Numerous beer and soda bottles are present including several clear glass bottles with "Hawaiian Soda Works, Honolulu T.H." embossed on the body and an "It" embossed on the base. Several aqua glass bottles with "AB" and "ES" embossed on the base were also observed. Other artifacts included a clear glass bottle fragment with "HONOLULU B+M CO, LTD- HONOLULU, T.H." embossed on the body and an unidentifiable embossing on the base, an amber beer bottle with "WF& S MIL. 46" embossed on the base, at least five clear glass unmarked wine bottles, and two clear glass, screw-top bottles with chamfered corners. Ceramics observed included several white ceramic plate fragments, and a hand-painted blue on white rice bowl with kanji on the base.

Site T-070 appears to represent a dump which occurred during the historic period.



Site T-070, artifact scatter, rice bowl.



Site T-070, artifact scatter, rice bowl base.



Site T-070, artifact scatter, Hawaiian Soda Works bottle.

SIHP No.:

Field No.: T-071

Site Type: Terraced Soil Furrows

Site Function: Agriculture

Site Condition: Fair

Description: Site T-071 is located in southwestern portion of the project area, just inside the project boundary and ca. 5.0 meters south of the Site T-030, soil ditch. Vegetation in the area consists of a large banyan tree, guava, Christmas berry and rubber trees. Site T-071 consists of a series of between 25 to 50 terraced soil furrows evenly spaced across a gentle to moderate slope. Each furrow is similar in size and shape, measuring ca. 80.0-100.0 meters in length by 1.7 meters wide by 0.25 meter in height. Overall, the site measures ca. 103.0 meters in length (northeast-southwest) by 46.0 meters in width (northwest-southeast). The area is mostly devoid of rock, although some small basalt cobbles are loosely scattered about. Site T-071 closely resembles the other terraced soil furrows recorded in the area (Site T-031, T-033). Site T-071 appears to have functioned as an agricultural field associated with the former commercial sugar plantation.



Site T-071, terraced soil furrows, view to west.

SIHP No.:

Field No.: T-072

Site Type: Cave

Site Function: Habitation

Site Condition: Fair

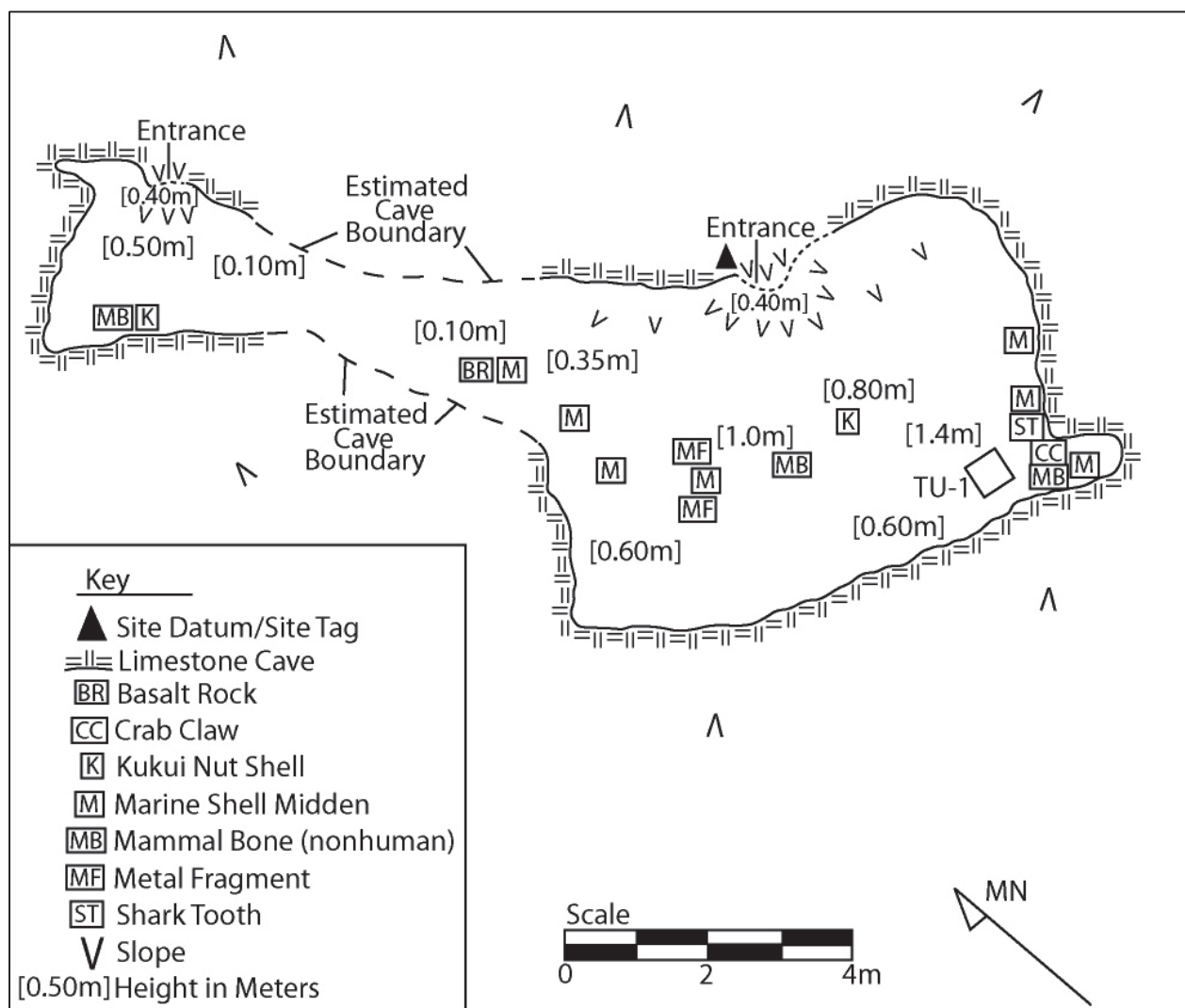
Description: Site T-072 consists of a limestone cave located in the central-eastern portion of the project area, within the newly added survey area. It is situated on a gentle northeast facing slope ca. 42.0 meters northeast of the Site T-073, concrete ditch. The surrounding area appears to have been graded by the former sugar plantation and is covered in *koa haole* and guava with loosely scattered limestone cobbles and boulders.

Site T-072 consists of a relatively small limestone cave with two separate small entrances. Overall, the interior of the cave measures ca. 15.0 meters in length (northwest-southeast) by 5.0 meters in width (northeast-southwest) with a maximum interior height of 1.4 meters. The main entrance to the main chamber is located at the southeast side of the cave. This entrance measures ca. 0.6 meters in length by 0.4 meters in width by 0.4 meters in height and is partially filled in with soil that appears to have been pushed in from around the entrance. This was likely done by the former sugar plantation, possibly in an attempt to seal the cave. The southeastern chamber is the largest portion of the cave measuring ca. 8.0 meters in length by 5.0 meters in width with a maximum interior height of 1.4 meters. The interior surface consists of soil with several loosely scattered limestone boulders and cobbles. A large variety of cultural material was observed on the interior surface of the cave including fragments of marine shell midden (cone, cowrie, *pipipi*, turban, sea urchin), one shark tooth, one crab claw, *kukui* nut shell, non-human medium mammal bone (likely cow and goat), at least one basalt cobble, as well as one fragment of metal, possibly a cover of some sort. No human skeletal remains were observed. The northwestern portion of the main chamber leads to the smaller chamber located at the northwest side of the cave, however, this portion of the cave is extremely small, measuring ca. 4.0 meters in length by 1.0 meter in width with a maximum ceiling height of only 0.1 meter. This portion of the cave was too small to be thoroughly inspected.

The smaller northwestern chamber is accessible from an entrance on the surface located at the northwest side of the cave. This entrance measures ca. 0.3 meter in length by 0.3 meter in width by 0.4 meter in height, and is also partially filled in with soil. The interior surface of the northwestern chamber also consists of soil with loosely scattered limestone cobbles and pebbles. This chamber measures ca. 4.0 meters in length by 3.0 meters in width with a maximum interior height of 0.5 meter. Fragments of *kukui* nut shell and non-human medium mammal bone (likely cow) were observed. No human skeletal remains were observed.

Site T-072 appears to have functioned as a traditional habitation cave that was likely utilized into the historic period.

A single 50 by 50 centimeter test unit was excavated at the back of the main southeastern chamber of the cave. The test unit uncovered a buried cultural deposit containing metal at the top of the excavation, along with basalt flakes, marine shell midden and non-human bone. Two charcoal samples were submitted for radiocarbon analysis and returned a date between the mid-1600s and 1800s. The results of the excavation are presented in Section 7.0 of this report.



Planview map of Site T-072.



Site T-072, main cave entrance, view to southwest.



Site T-072, main cave entrance, view to southwest.

SIHP No.:

Field No.: T-073

Site Type: Concrete Ditch

Site Function: Water Transport

Site Condition: Fair

Description: Site T-073 consists of a concrete ditch located in the central-eastern portion of the project area within the new survey area. The ditch is oriented roughly northwest to southeast and measures ca. 175.0 meters in length by 0.8-1.0 meter in width by 0.46-1.0 meter in depth. It is constructed formed concrete along the interior and stacked limestone cobbles and concrete along the exterior. Both ends of the ditch have been destroyed by bull-dozing activities. Site T-073 appears to be associated with water transport related to the former commercial sugar plantation.



Site T-073, concrete ditch, view to southeast.

SIHP No.:

Field No.: T-074

Site Type: Complex

Site Function: Water Transport

Site Condition: Fair

Description: Site T-074 is located in the central-eastern portion of the project area within the new survey area. The site consists of five associated features; an aqueduct (Feature A), two concrete ditches (Feature B and Feature E), a soil ditch (Feature C), and a limestone retaining wall (Feature D). Overall, Site T-074 measures ca. 117.0 meters in length.

Feature A consists of a concrete aqueduct located on the west side of Site T-074. It is oriented roughly north to south and spans a small drainage. The aqueduct measures ca. 21.0 meters in length by 1.08 meters in width and has a maximum height of 2.4 meters. Feature A has two gentle arches and a third rectangular gap located on the south end. These arches allow water to pass underneath the aqueduct without damaging the structure. Each arch measures ca. 5.6 meters in width by 1.8 meters in height. The rectangular gap measures ca. 2.6 meters in width by 1.2 meters in height. A large banyan tree is growing near the center of the aqueduct, and has actually encased part of structure and broken through in several sections. The northern portion of the aqueduct flows directly into the Feature B, concrete ditch.

Feature B is a concrete ditch that is connected to the north end of the Feature A, aqueduct. The ditch is oriented roughly east to west along the northern slope of the drainage. It measures ca. 38.0 meters in length by 1.04 meters in width (exterior) by 0.61 meter in width (interior) by 0.36 meter in depth. It is constructed of red brick and rebar, covered by concrete. The exterior portion of the ditch consists of stacked and cemented limestone cobbles. The east end of Feature B gradually flows into the Feature C, soil ditch.

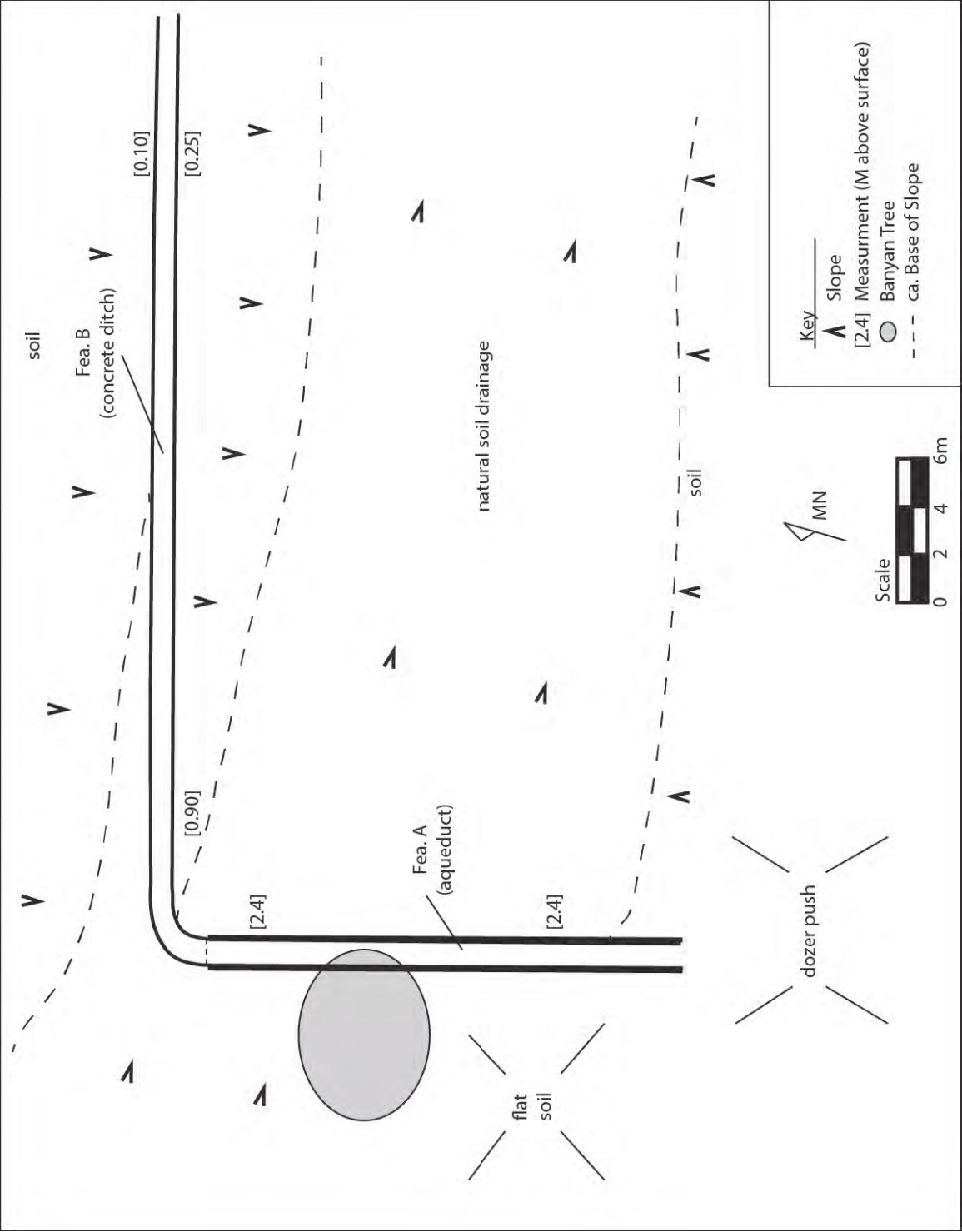
Feature C consists of a soil ditch connected to the east end of the Feature B, concrete ditch. Feature C measures ca. 46.3 meters in length by 1.2 meters in width by 0.3 meters in depth. The ditch abuts a section of the Feature D, limestone retaining wall, to the south, and flows directly into the Feature E, concrete ditch, at the east end.

Feature D is a limestone retaining wall located along the south side of the Feature C, soil ditch. The retaining wall is constructed of limestone boulders and cobbles that have been loosely stacked between three to five courses of stone in height. Overall, Feature D measures ca. 3.0 meters in length by 1.0 meter in depth by 0.8 meter in height. It was likely used to support and retain the Feature C, soil ditch.

Feature E consists of a concrete ditch connected to the east end of the Feature C, soil ditch. The ditch is constructed of concrete and fragments of red brick and stacked limestone cobbles. Overall, Feature E measures ca. 11.7 meters in length by 1.0 meter in width by 0.3 meter in depth. Only the south edge of the ditch is visible. The north side of the ditch is covered with soil and debris from bull-dozing upslope. The east end of the ditch terminates at an active agricultural field. A large track excavator is parked nearby. A metal/iron railroad spike was observed on the surface of Feature E and measures ca. 12.0 centimeters in length by 1.0

centimeter in width. It was likely deposited on the ditch from the bull-dozing disturbance above, although there is no evidence of a railroad in the area.

Site T-074 appears to be associated with water transport related to the former commercial sugar plantation.



Planview map of Site T-074, Features A and B.



Site T-074, Fe. A, aqueduct, view to southwest.

SIHP No.:

Field No.: T-077

Site Type: Soil Ditch

Site Function: Water Transport

Site Condition: Fair

Description: Site T-077 consists of a soil ditch located in the central-eastern portion of the project area, ca. 5.0 meters east of an active banana farm. The northern end of the ditch is located ca. 10.0 meters south of the Site T-074, Feature A, concrete aqueduct. There is a bulldozed area between the two sites. The ditch is oriented roughly north to south, and overall, measures ca. 258.0 meters in length by 2.0-3.0 meters in width by 0.5-1.0 meter in depth. The ditch is split into two sections with an 11.0 meter gap bulldozed in between them. The northern portion of the ditch measures ca. 140.0 meters in length and the southern portion measures ca. 118.0 meters in length. The ditch curves around the contour of the slope and terminates on the south end where it has been filled in with soil and deadfall. Site T-077 appears to be associated with water transport related to the former commercial sugar plantation.



Site T-077, soil ditch, view to north.

SIHP No.:

Field No.: T-078

Site Type: Concrete Ditch

Site Function: Water Transport

Site Condition: Poor

Description: Site T-078 consists of a concrete ditch intersection located ca. 2.5 meters south of the existing Department of Agriculture road "A". The site is situated on a small slope beneath an existing agricultural lot. Vegetation in this area includes Christmas berry and *koa haole* trees. The ditch is constructed of concrete along the interior and basalt cobbles concreted in place along the exterior. Overall, the site measures ca. 5.0 meters in length (east-west) by 3.5 meters in width (north-south). The ditch is ca. 0.6 meter in width by 0.55 meter in interior depth and 0.9 meter in maximum exterior height. There are built in slots for a gate. A modern PVC pipe is used by the farm to transport water. Site T-077 appears to be associated with water transport related to the former commercial sugar plantation.



Site T-078, concrete ditch, view to south.

APPENDIX C
TRENCH DESCRIPTIONS

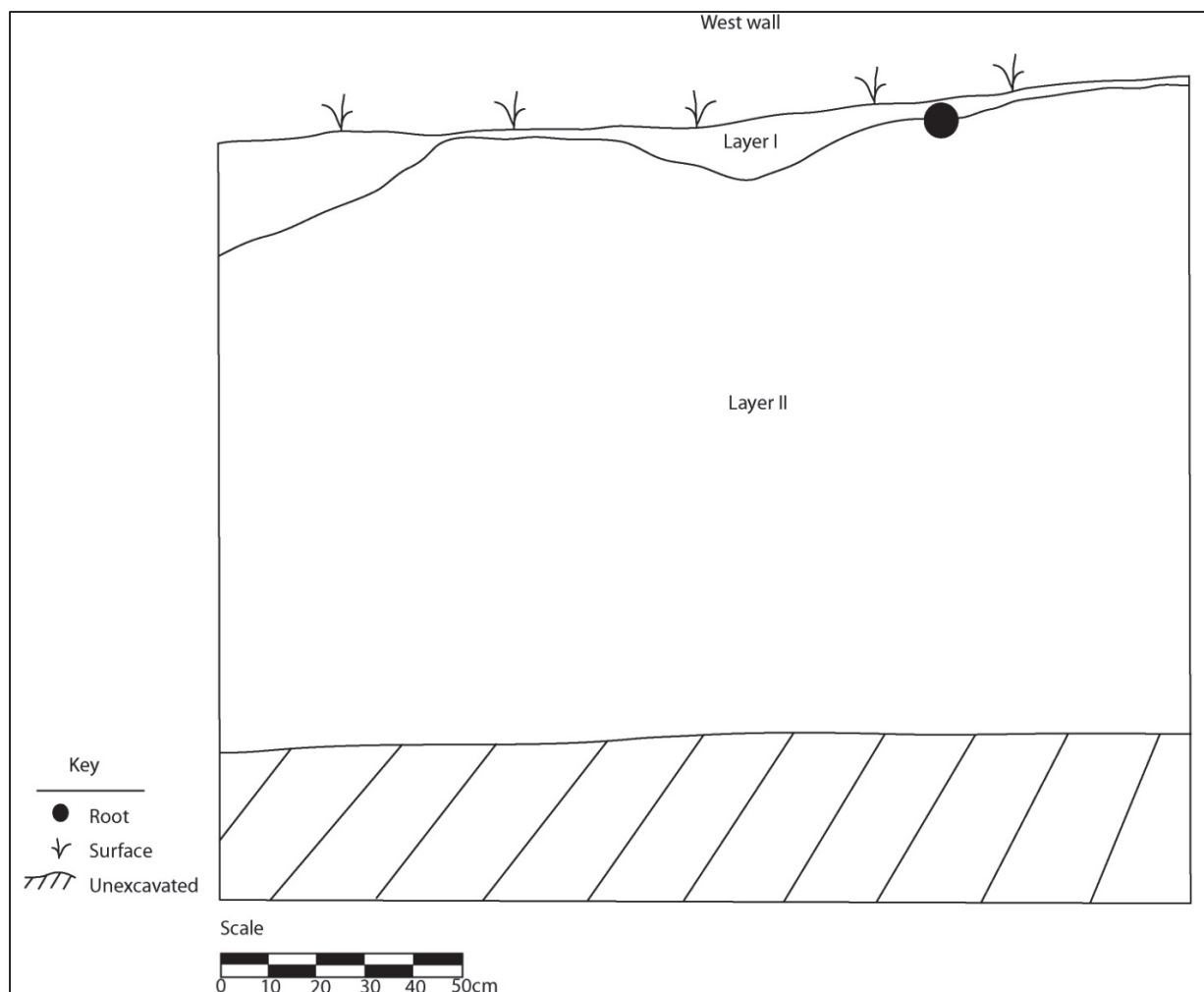
This appendix presents descriptions of the stratigraphic profiles revealed in the 16 backhoe trenches excavated within the project APE. The locations of the backhoe trenches are shown in Figure 19. The location, orientation, and size of each trench is presented; the soil layers are described, drawn in profile, and a photograph is presented.

Trench 1

Trench 1 is located in the N/E portion of the project area, c. 5 meters south of a E/W dirt access road, c. 20 meters south of an active agricultural field (basil), and c. 10 meters north of a N/E-S/W drainage (Figure 19). The trench is located in a natural sand deposit. The trench is oriented N-S (350°-170°) and measures c. 5.50 meters in length (N-S) by 0.80-1.20 meters in width (E-W) by 1.35 meters in depth.



Trench 1, west wall.



Trench 1, west wall profile.

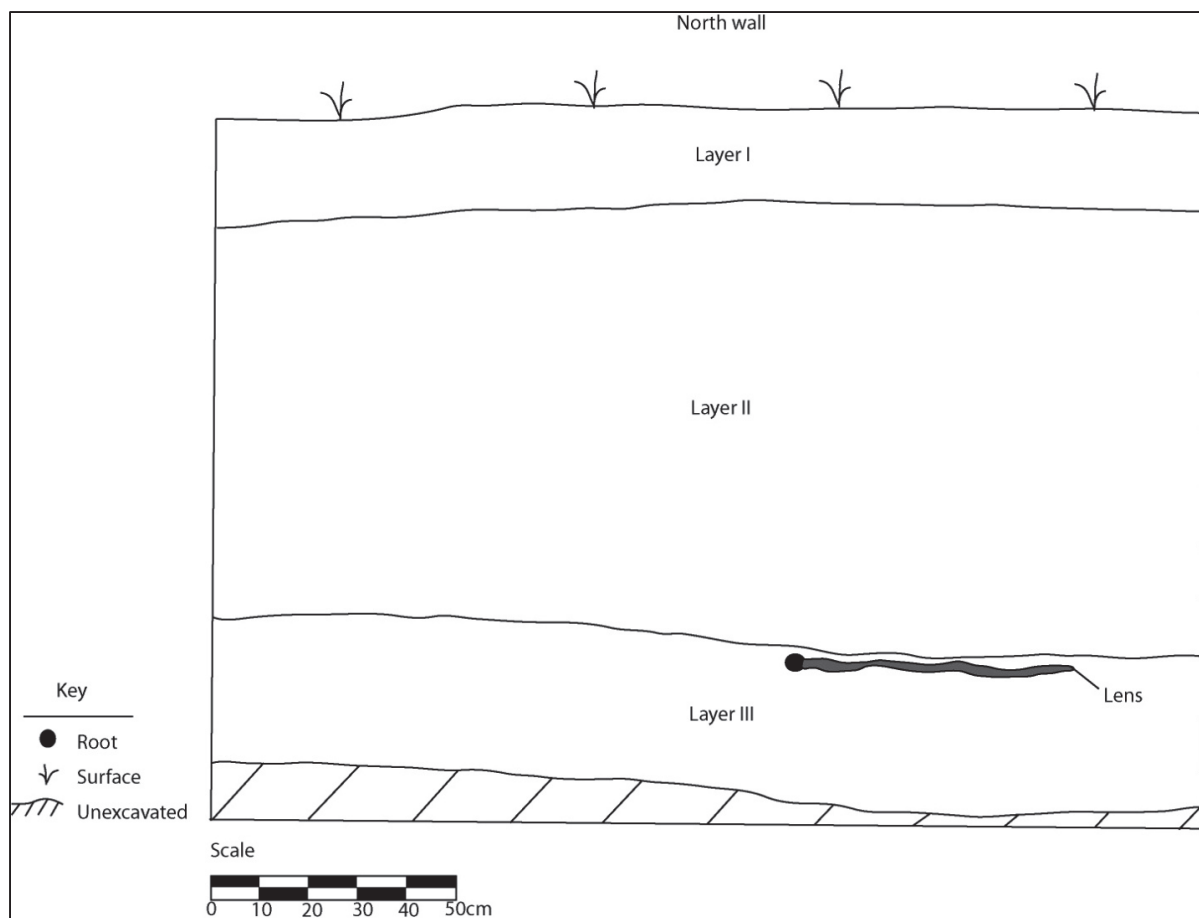
Layer	Depth	Description
Layer I	0-22 cmbs (22 cm)	Very dark brown (10YR 2/2) sandy loam; weak, fine granular; loose, noncoherent, nonsticky, nonplastic; abrupt wavy boundary. Mixture of soil/sand.
Layer II	2-135 cmbs (133 cm)	Pale yellow (2.5Y 8/3) sand; structureless, fine, single grain; loose, noncoherent, nonsticky, nonplastic. Sand.

Trench 2

Trench 2 is located in the N/E portion of the project area, in between two active agricultural fields, c. 2 meters south of a dirt access road (Figure 19). Trench 2 is located in a sand deposit. Trench 2 is oriented E/W (90°-270°) and measures 5.5 m long.



Trench 2, north wall.



Trench 2, north wall profile.

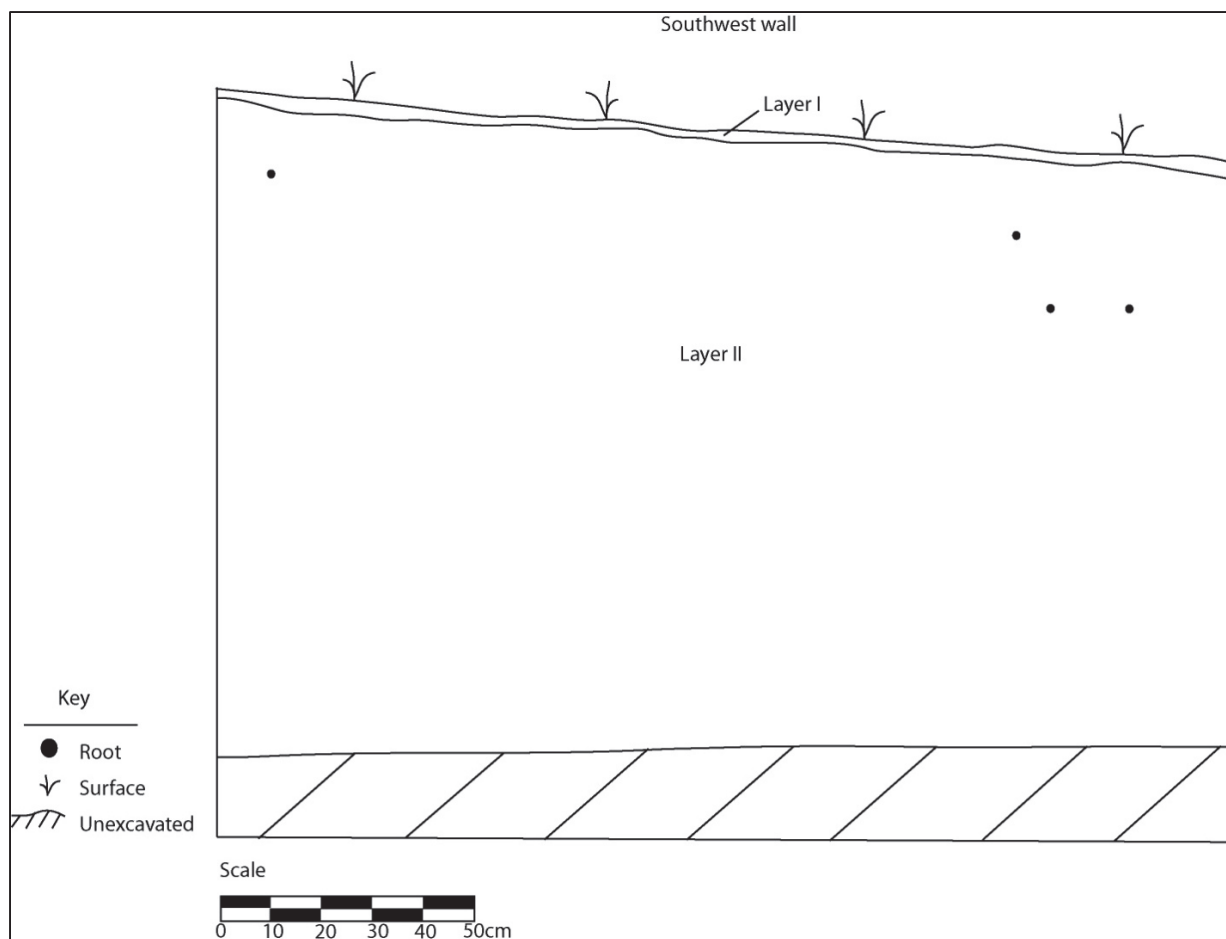
Layer	Depth	Description
Layer I	0-22 cmbs (22 cm)	Dark yellowish brown (10 YR 3/4) sandy loam; weak, fine, granular; very friable, nonsticky, nonplastic; abrupt smooth boundary. Mixture of soil and sand.
Layer II	20-110 cmbs (90 cm)	Very pale brown (10YR 8/3) sand; structureless, fine, single grain; loose, noncoherent, nonsticky, nonplastic; abrupt smooth boundary. Sand.
Layer III	101-141 cmbs (31 cm)	Dark brown (7.5YR 3/3) silty clay; moderate, coarse, crumb; friable, sticky, plastic. Soil.
Lens	112-115 cmbs (3 cm)	Dark brown with charcoal flecking and ash (7.5 YR 3/3) silty clay with charcoal/ash; moderate, coarse, crumb; friable, sticky, plastic; abrupt smooth boundary. Soil with charcoal/ash, root burn.

Trench 3

Trench 3 is located in the eastern portion of the project area, within the proposed pad for Turbine #9, north of the center point for Turbine #9 (Figure 19). Trench 3 is situated c. 2 meters west of a N-S dirt access road and c. 2 meters N/E of an active agricultural field. Trench 3 is oriented N/W-S/E (310°-130°) and measures c. 3.5 meters in length (N/W-S/E) by 0.70-0.80 meters in width (N/E-S/W) by 1.2 meters in depth.



Trench 3, southwest wall.



Trench 3, Southwest wall profile.

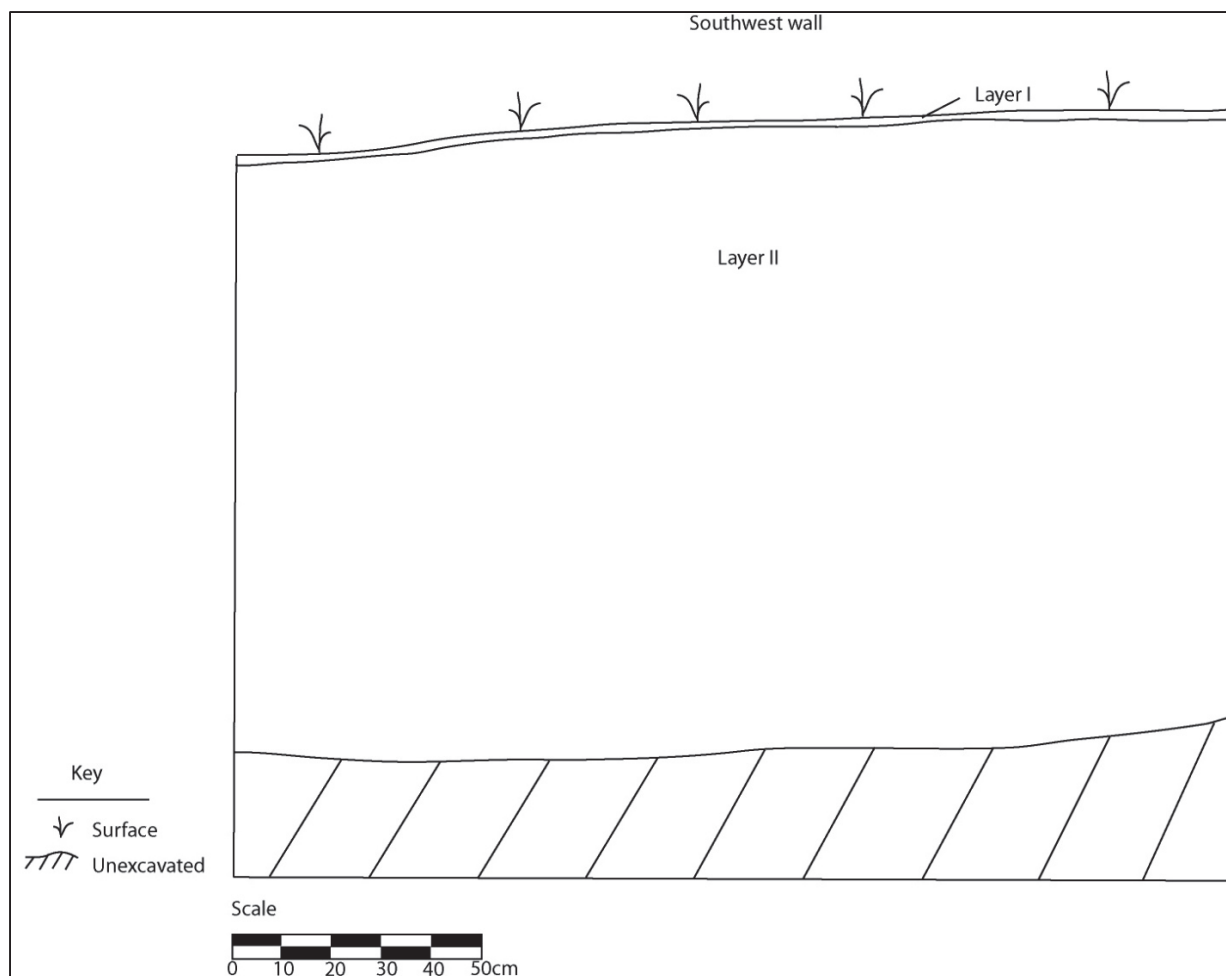
Layers	Depth	Description
Layer I	0-2 cmbs (2 cm)	Dark reddish brown (5YR 3/3) silty clay with recent organics; moderate, coarse, crumb; friable, sticky, plastic; abrupt smooth boundary. Contains recent organic material.
Layer II	2-127 cmbs (125 cm)	Dark reddish brown (5YR 3/4) silty clay; moderate, medium, platy; friable, sticky, plastic.

Trench 4

Trench 4 is located in the central portion of the project area, within the proposed pad for Turbine #6, east of the center point for Turbine #6 (Figure 19). Trench 4 is situated on a N/W-S/E dirt access road, c. 2 meters east of an active agricultural field (taro). Trench 4 is oriented N/W-S/E (310°-130°) and measures c. 4 meters in length (N/W-S/E) by 0.60-0.80 meters in width (N/E-S/W) by 1.20 meters in depth. Trench 4 consists of Layer I and Layer II.



Trench 4, southwest wall.



Trench 4, southwest wall profile.

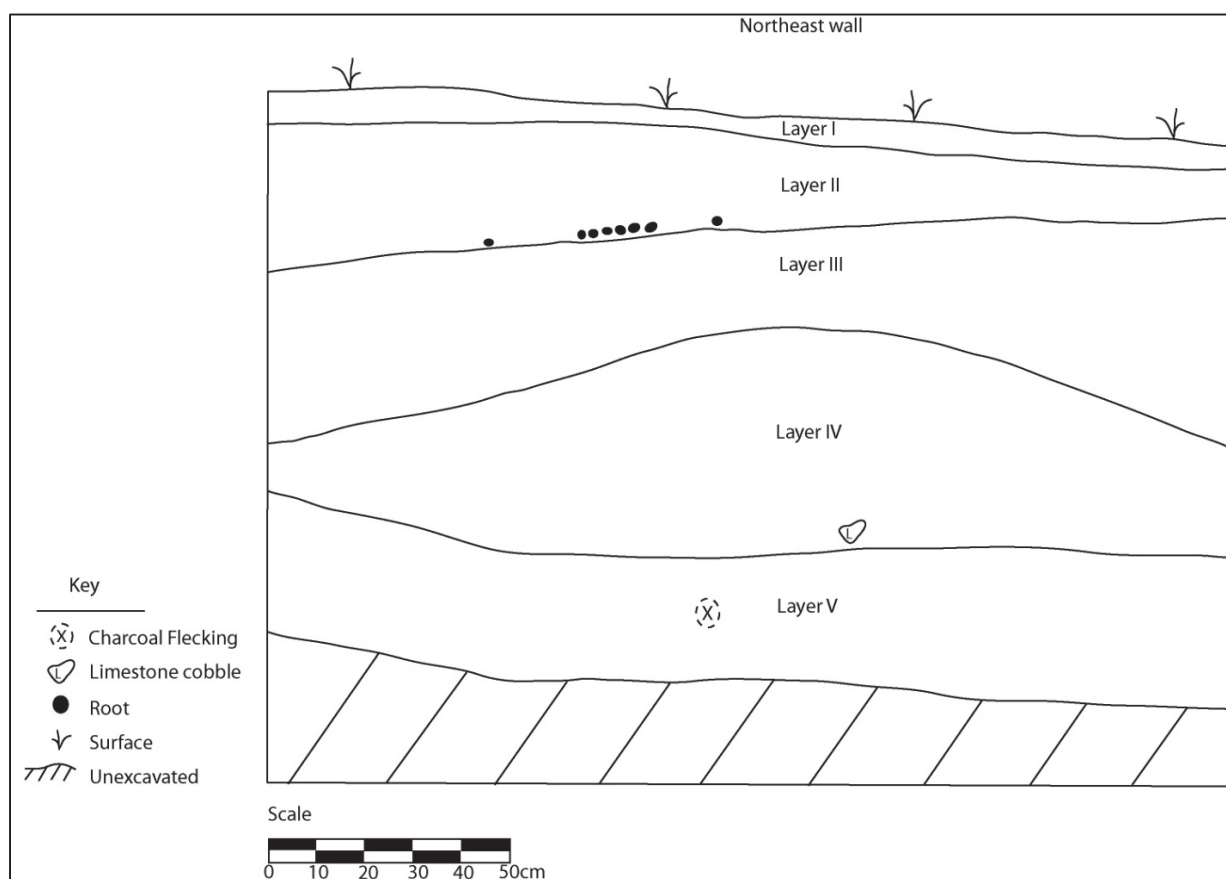
Layer	Depth	Description
Layer I	0-2 cmbs (2 cm)	Dark reddish brown (5YR 3/2) silty clay with grass; strong, medium, subangular blocky; very firm, sticky, plastic; abrupt smooth boundary. Contains grass and recent organic material.
Layer II	2-119 cmbs (117 cm)	Dark reddish brown (2.5 YR 3/4) silty clay; moderate, coarse, crumb; firm, sticky, plastic. Contains small amounts of charcoal flecking.

Trench 5

Trench 5 is located in the northern central portion of the project area, along the proposed transmission line route (Figure 19). Trench 5 is situated c. 2 meters S/E of a N/E-S/W dirt access road. Trench 5 is oriented N/W-S/E (320°-140°) and measures c. 3.8 meters in length (N/W-S/E) by 0.90 meters in width (N/E-S/W) by 1.25 meters in depth. Trench 5 consists of Layer I, Layer II, Layer III, Layer IV, and Layer V.



Trench 5, northeast wall.



Trench 5, northeast wall profile.

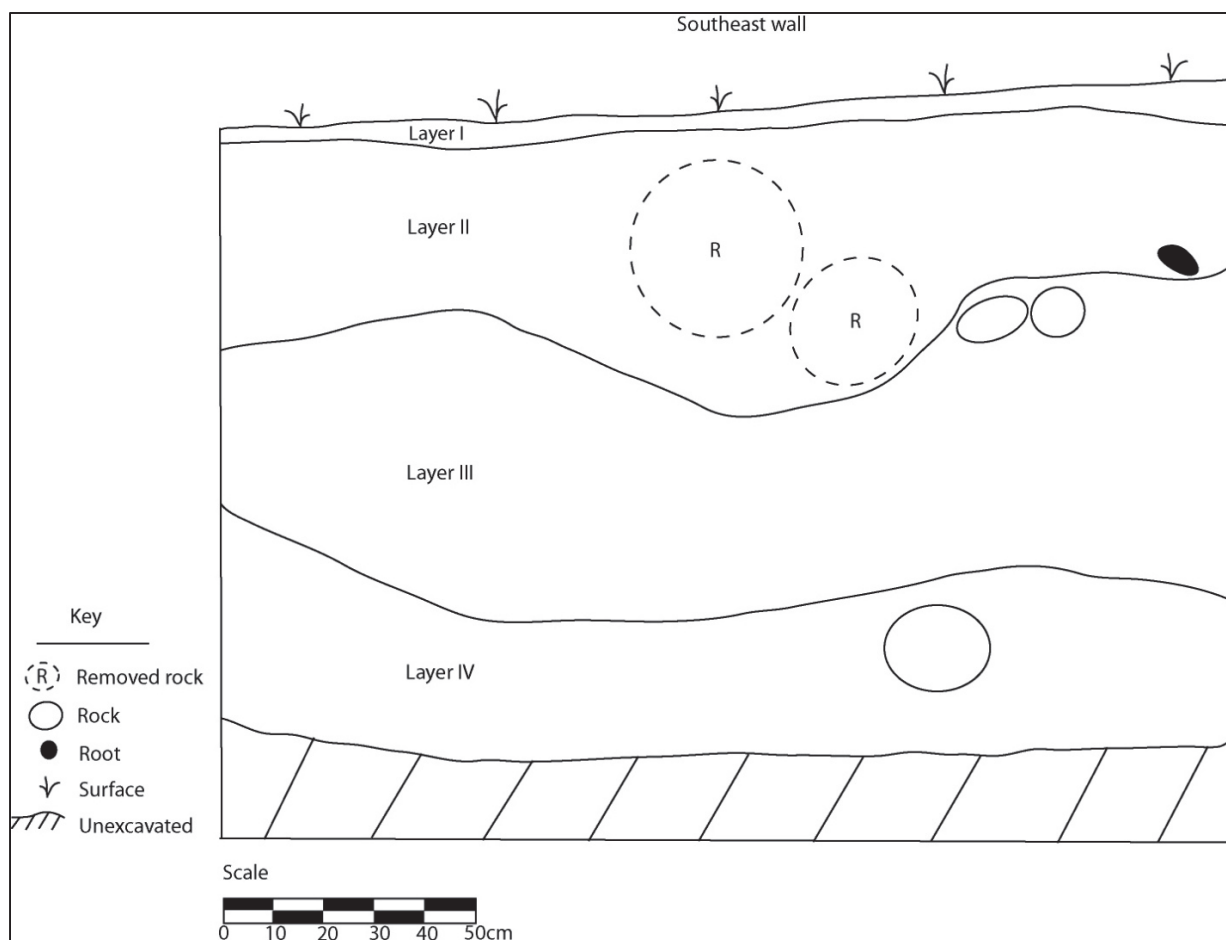
Layer	Depth	Description
Layer I	0-9 cmbs (9 cm)	Dark Reddish Brown (5YR 3/3) silty clay; strong, medium, subangular blocky; firm, sticky, plastic; abrupt smooth boundary. Contains grass and recent organic material.
Layer II	9-37 cmbs (30 cm)	Dark Reddish Brown (5YR 3/3) silty clay; strong, medium, subangular blocky; firm, sticky, plastic; abrupt smooth boundary. Contains fragments of limestone.
Layer III	25-79 cmbs (47 cm)	Dark reddish brown (5YR 3/3) silty clay; strong, fine, subangular blocky; very firm, sticky, plastic, abrupt wavy boundary.
Layer IV	42-90 cmbs (40 cm)	Dark brown (7.5 YR 3/3) silty clay; strong very fine, subangular blocky; very firm, sticky, plastic; abrupt smooth boundary. Contains fragments of limestone.
Layer V	83-125 cmbs (30 cm)	Dark Reddish brown (5YR 3/4) silty clay; moderate, very fine, subangular blocky; friable, sticky, plastic. Contains a small amount of charcoal flecking.

Trench 6

Trench 6 is located in the north central portion of the project area, along the proposed transmission line (Figure 19). Trench 6 is situated on a N/E-S/W dirt access road c. 5 meters S/E of a natural N/E-S/W drainage. Trench 6 is oriented N/E-S/W (40°-220°) and measures 4.5 meters in length (N/E-S/W) by 0.90-1.10 meters in width (N/W-S/E) by 1.25 meters in depth. Trench 6 consists of Layer I, Layer II, Layer III, Layer IV.



Trench 6, southeast wall.



Trench 6, southeast wall profile.

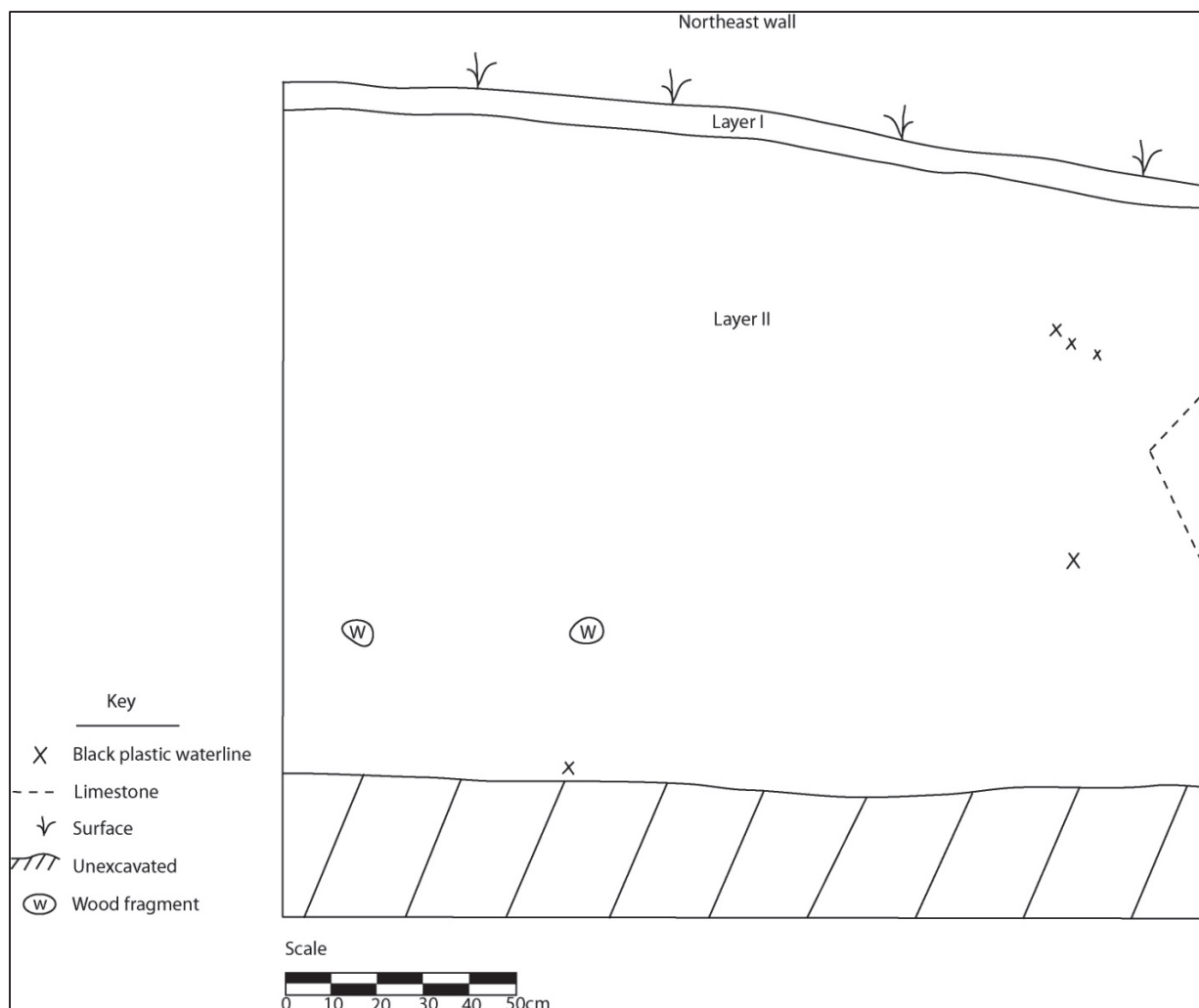
Layer	Depth	Description
Layer I	0-9 cmbs (9 cm)	Very dark brown (7.5 YR 2.5/3) silty clay; moderate, medium, subangular blocky; friable, very sticky, very plastic; abrupt smooth boundary. Contains grass and recent organic material.
Layer II	6-67 cmbs (65 cm)	Very dark brown (7.5 YR 2.5/2) silty clay; moderate, fine, subangular blocky; friable, sticky, plastic, abrupt wavy boundary. Contains basalt boulders.
Layer III	36-102 cmbs (65 cm)	Very dark brown (7.5 YR 2.5/3) silty clay; moderate, medium, platy; firm, very sticky, very plastic; abrupt wavy boundary. Contains basalt boulders
Layer IV	86-125 cmbs (40 cm)	Brown (7.5 YR 4/3) silty clay; moderate, fine, subangular blocky; friable, sticky, plastic. Contains basalt boulders and decomposing rock.

Trench 7

Trench 7 is located in the south central portion of the project area, within the proposed pad for Turbine #7, S/W of the center point for Turbine #7 (Figure 19). Trench 7 is situated c. 3 meters S/E of a N/E-S/W dirt access road and c. 3 meters S/W of an active agricultural field (tomato). Trench 7 is oriented N/W-S/E (320°-140°) and measures c. 4.7 meters in length (N/W-S/E) by 0.70-0.90 meters in width (N/E-S/W) by 1.5 meters in depth. Trench 7 consists of Layer I, Layer II.



Trench 7, northeast wall.



Trench 7, northeast wall profile.

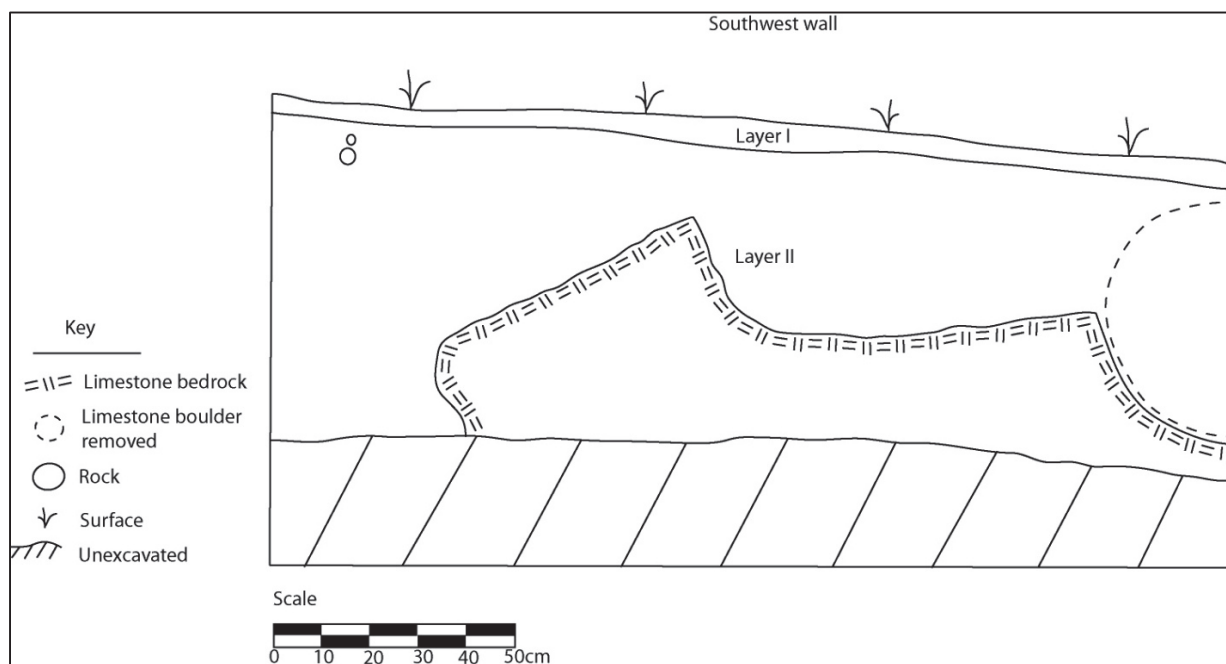
Layer	Depth	Description
Layer I	0-9 cmbs (9 cm)	Very dark brown (7.5 YR 2.5/3) silty clay; strong, medium, subangular blocky; firm, sticky, plastic; abrupt smooth. Contains recent organic material and modern agricultural rubbish.
Layer II	9-150 cmbs (141 cm)	Very dark brown (7.5 YR 2.5/3) silty clay; moderate, fine, subangular blocky; friable, very sticky, very plastic. Contains modern agricultural rubbish and fragments of limestone and decomposing natural wood fragments.

Trench 8

Trench 8 is located in the north eastern portion of the project area, c. 15 meters S/E of an E-W dirt access road (Figure 19). Trench 8 is oriented N/W-S/E (340°-160°) and measures c. 3.7 meters in length (N/W-S/E) by 0.90-1.6 meters in width (N/E-S/W) by 0.72 meters in depth. Trench 8 consists of Layer I, Layer II.



Trench 8, southwest wall.



Trench 8, southwest wall profile.

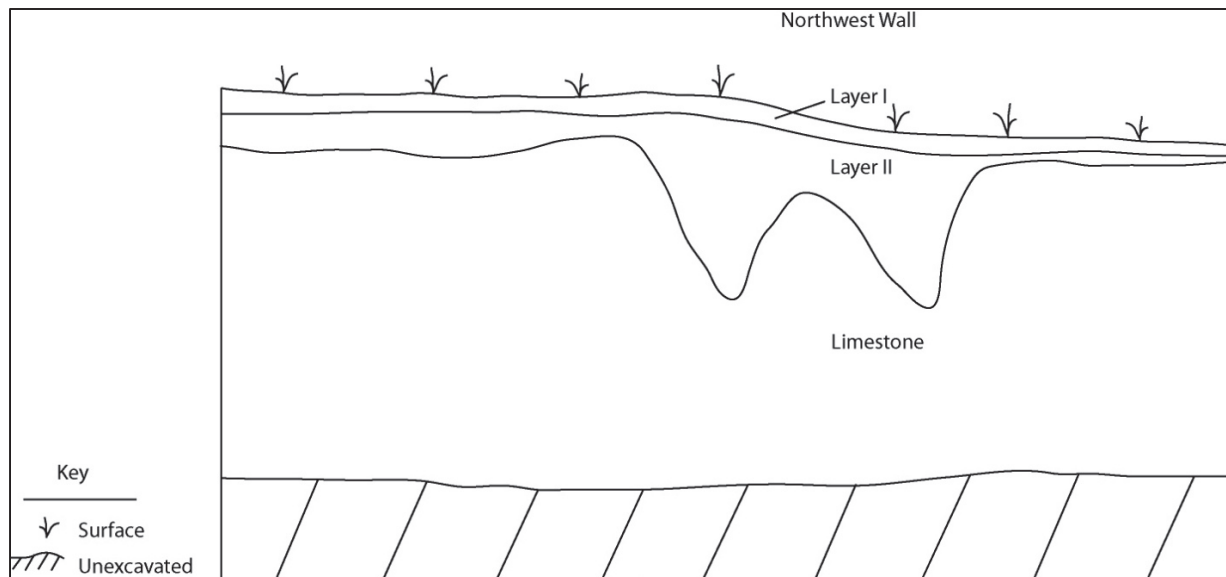
Layer	Depth	Description
Layer I	0-6 cmbs (6 cm)	Dark brown (7.5 YR 3/3) silty clay; moderate, medium, crumb; very friable, slightly sticky, slightly plastic; abrupt smooth. Contains rootlets and recent organic material.
Layer II	6-72 cmbs (66 cm)	Dark brown (7.5 YR 3/4) silty clay; moderate, coarse, subangular blocky; friable, sticky, plastic.
-	20-72 cmbs	Limestone bedrock and boulders.

Trench 9

Trench 9 is located in the central eastern portion of the project area, within the eastern portion of the proposed lay down area, east of the center for the proposed Turbine #10 (Figure 19). Trench 9 is situated in an old sugar cane field that is overgrown with *koa haole* trees. Trench 9 is oriented N/E-S/W (50°-230°) and measures c. 4 meters in length (N/E-S/W) by 0.60-0.90 meters in width (N/W-S/E) by 0.82 meters in depth. Trench 9 consists of Layer I, Layer II.



Trench 9, northwest wall.



Trench 9, northwest wall profile.

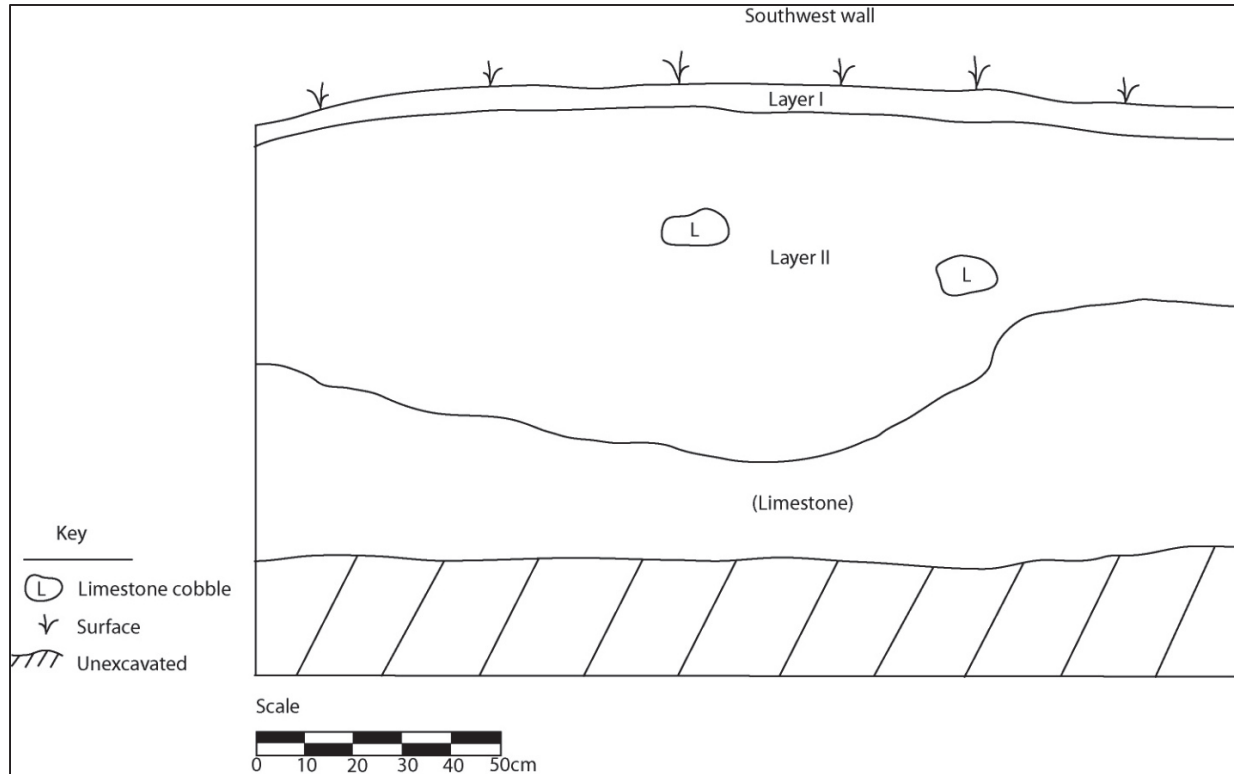
Layer	Depth	Description
Layer I	0-12 cmbs (6 cm)	Dark yellowish brown (10YR 4/4) silty clay; moderate, medium, crumb; very friable, slightly sticky, slightly plastic, abrupt smooth boundary. Contains grass and recent organic material. Also contains fragments of limestone.
Layer II	5-42 cmbs (37 cm)	Strong brown (7.5YR 4/6) silty clay; moderate, fine, subangular blocky; friable, sticky, plastic
-	10-82 cmbs (70 cm)	Limestone bedrock.

Trench 10

Trench 10 is located in the central eastern portion of the project area, within the N/W portion of the proposed lay down area, N/W of the center point for the proposed Turbine #10 (Figure 19). Trench 10 is situated in an old sugarcane field that is overgrown with *koa haole* trees. Trench 10 is oriented N/W-S/E (310°-130°) and measures c. 3.5 meters in length (N/W-S/E) by 0.85-1.40 meters in width (N/E-S/W) by 1.0 meters in depth. Trench 10 consists of Layer I, Layer II.



Trench 10, southwest wall.



Trench 10, southwest wall profile.

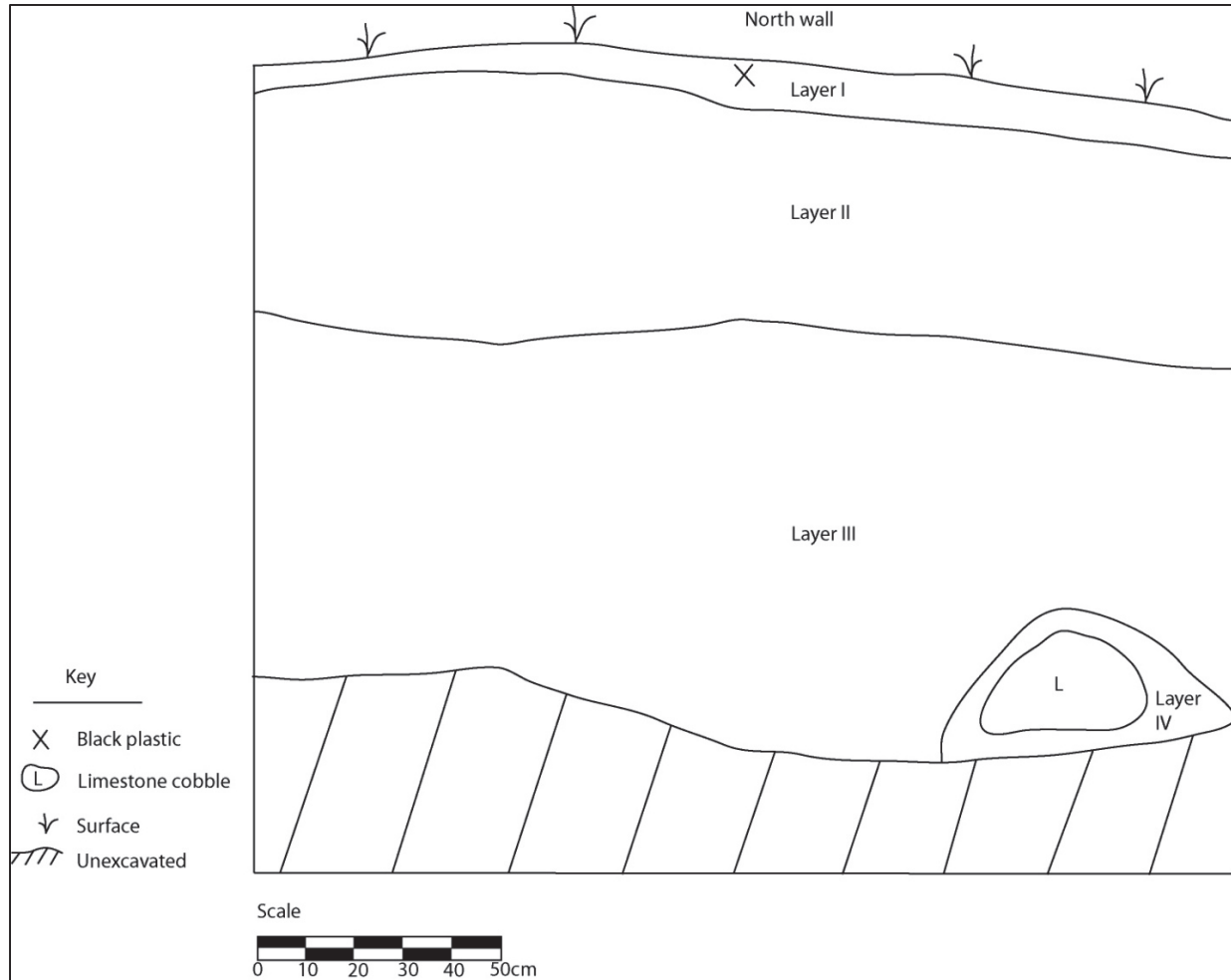
Layer	Depth	Description
Layer I	0-12 cmbs (7 cm)	Dark brown (7.5 YR 3/4) silty clay; moderate, medium, crumb; friable, slightly sticky, slightly plastic; abrupt smooth boundary. Contains recent organic material.
Layer II	6-79 cmbs (74 cm)	Dark reddish brown (5 YR 3/4) silty clay; moderate, fine, subangular blocky; friable, sticky, plastic. Contains fragments of limestone. Outside of profile, contains some pieces of modern agricultural plastic.
	45-100 cmbs (55 cm) +	Limestone.

Trench 11

Trench 11 is located in the northeastern portion of the project area, S/W of the proposed road to Turbine #11 (Pad #11) and west of the center point for Turbine #11 (Figure 19). Trench 11 is situated c. 2 meters east of an active agricultural field (bananas). Trench 11 is oriented E-W (90°-270°) and measures c. 3.8 meters in length (E-W) by 0.60-0.65 meters in width (N-S) by 1.46 meters in depth. Trench 11 consists of Layer I, Layer II, Layer III, Layer IV.



Trench 11, north wall.



Trench 11, north wall profile.

Layer	Depth	Description
Layer I	0-25 cmbs (12 cm)	Dark brown (7.5 YR 3/3) silty clay; strong, fine, subangular blocky; very firm, very sticky, very plastic; abrupt smooth boundary. Contains grass and recent organic material. Also contains fragment of modern black bag plastic.
Layer II	5-67 cmbs (57 cm)	Dark brown (7.5 YR 3/3) silty clay; strong, medium, subangular blocky; firm, very sticky, very plastic; abrupt smooth boundary.
Layer III	58-146 cmbs (90 cm)	Dark brown (7.5 YR 3/4) silty clay; weak, medium, platy; firm, very sticky, very plastic. Contains some charcoal flecking.
Layer IV	115-146 cmbs (30 cm)	Strong brown (7.5 YR 4/6) silty clay; moderate, fine, subangular blocky; firm, sticky, plastic. Contains limestone.

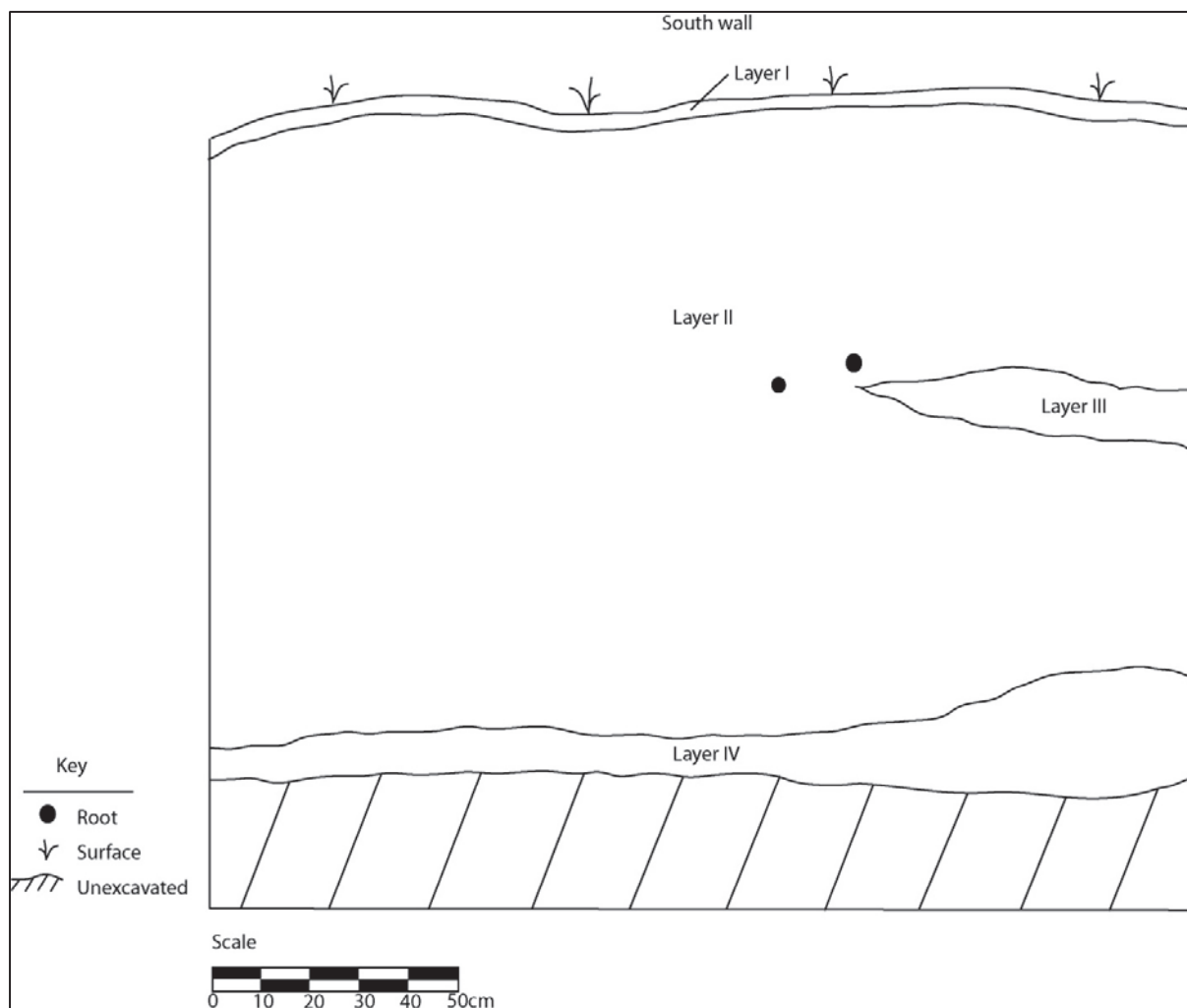
Trench 12

Trench 12 is located in the southeastern portion of the project area, in the southwestern portion of the proposed pad for Turbine #12, S/W of the center point for Turbine #12 (Figure 19).

Trench 12 is situated on an E-W dirt access road. Trench 12 is oriented E-W (110°-290°) and measures c. 4 meters in length (E-W) by 0.60-.80 meters in width (N-S) by 1.41 meters in depth. Trench 12 consists of Layer I, Layer II, Layer III, Layer IV.



Trench 12, south wall.



Trench 12, south wall profile.

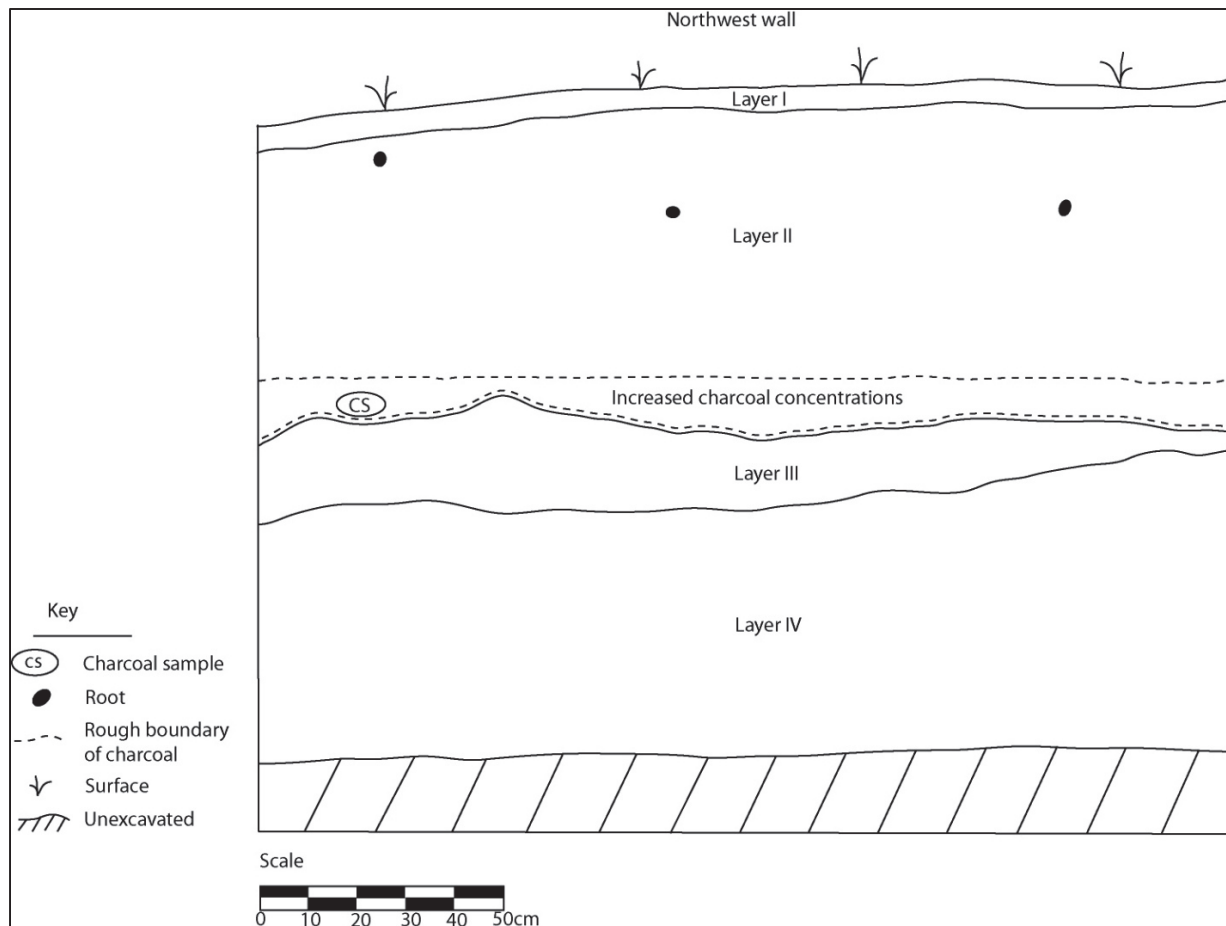
Layer	Depth	Description
Layer I	0-3 cmbs (3 cm)	Dark reddish brown (5 YR 3/3) silty clay; moderate, coarse, crumb; firm, very sticky, very plastic; abrupt smooth boundary. Contains leaves and roots and recent organic material.
Layer II	3-123 cmbs (125 cm)	Dark reddish brown (5 YR 3/4) silty clay; weak, medium, crumb; friable, sticky, plastic; abrupt smooth boundary.
Layer III	56-69 cmbs (13 cm)	Dark reddish brown (5 YR 3/4) with brown (7.5 YR 4/4) silty clay; weak, medium, crumb; friable, slightly sticky, slightly plastic; abrupt smooth boundary.
Layer IV	115-141 cmbs (26 cm)	Dark reddish brown (5 YR 3/4) with brown (7.5 YR 4/4) silty clay; weak, medium, crumb; friable, slightly sticky, slightly plastic.

Trench 13

Trench 13 is located in the eastern portion of the project area, within the proposed access road to Pad #8/Turbine #8, southwest of Pad #8/Turbine #8 (Figure 19). Trench 13 is situated in a previously cleared area that is now overgrown with grass and weeds. Trench 13 is oriented N/E-S/W (40°-220°) and measures c. 4.5 meters in length (N/E-S/W) by 0.55-0.80 meters in width (N/W-S/E) by 1.38 meters in depth. Trench 13 consists of Layer I, Layer II, Layer III, and Layer IV. The charcoal identified between layers II and III is the result of modern agricultural activities.



Trench 13, northwest wall.



Trench 13, northwest wall profile.

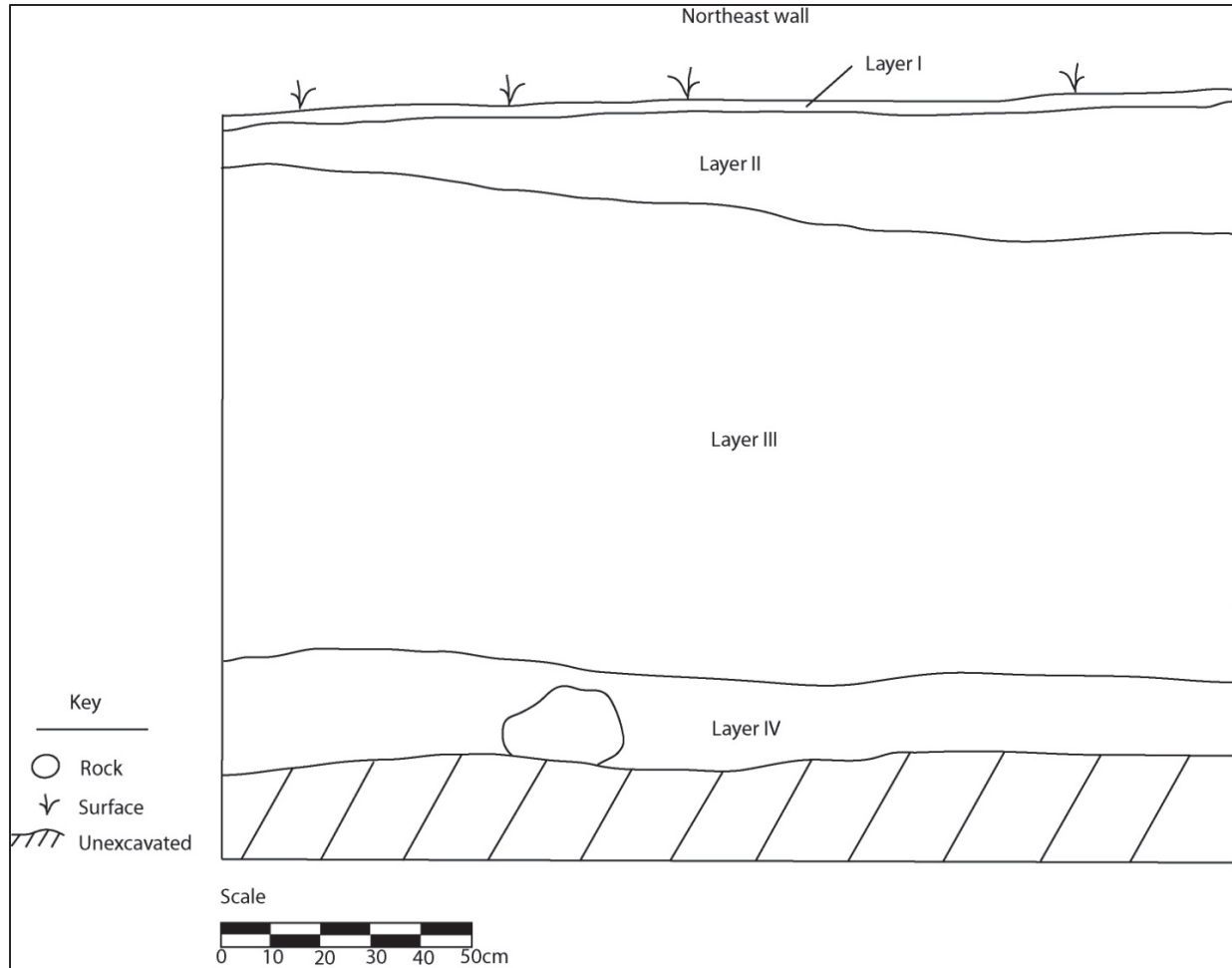
Layer	Depth	Description
Layer I	0-6 cmbs (6 cm)	Very dark brown (7.5 YR 2.5/3) silty clay; moderate, coarse, crumb; friable, very sticky, very plastic; abrupt smooth boundary. Contains grass and recent organic material.
Layer II	4-72 cmbs (65 cm)	Very dark brown (7.5 YR 2.5/3) silty clay; weak, medium, subangular blocky; friable, very sticky, very plastic; abrupt smooth boundary. Contains chunks of charcoal towards the base of the layer. Charcoal sample 67cmbs.
Layer III	61-84 cmbs (24 cm)	Dark reddish brown (5 YR 3/4) silty clay; weak, medium, subangular blocky; firm, very sticky, very plastic; abrupt smooth boundary.
Layer IV	76-138 cmbs (62 cm)	Dark reddish brown (5 YR 3/3) silty clay; weak, fine, crumb; friable, very sticky, very plastic.

Trench 14

Trench 14 is located in the northwestern portion of the project area, on Department of Agriculture Land, within the proposed access road from Kamehameha Highway to Pad/Turbine #1 (Figure 19). Trench 14 is situated in an active agricultural field, in between several active agricultural fields (DOA). Trench 14 is oriented N/W-S/E (330°-150°) and measures c. 4 meters in length (N/W-S/E) by 0.65-0.80 meters in width (N/E-S/W) by 1.4 meters in depth. Trench 14 consists of Layer I, Layer II, Layer III, Layer IV.



Trench 14, northeast wall.



Trench 14, northeast wall profile.

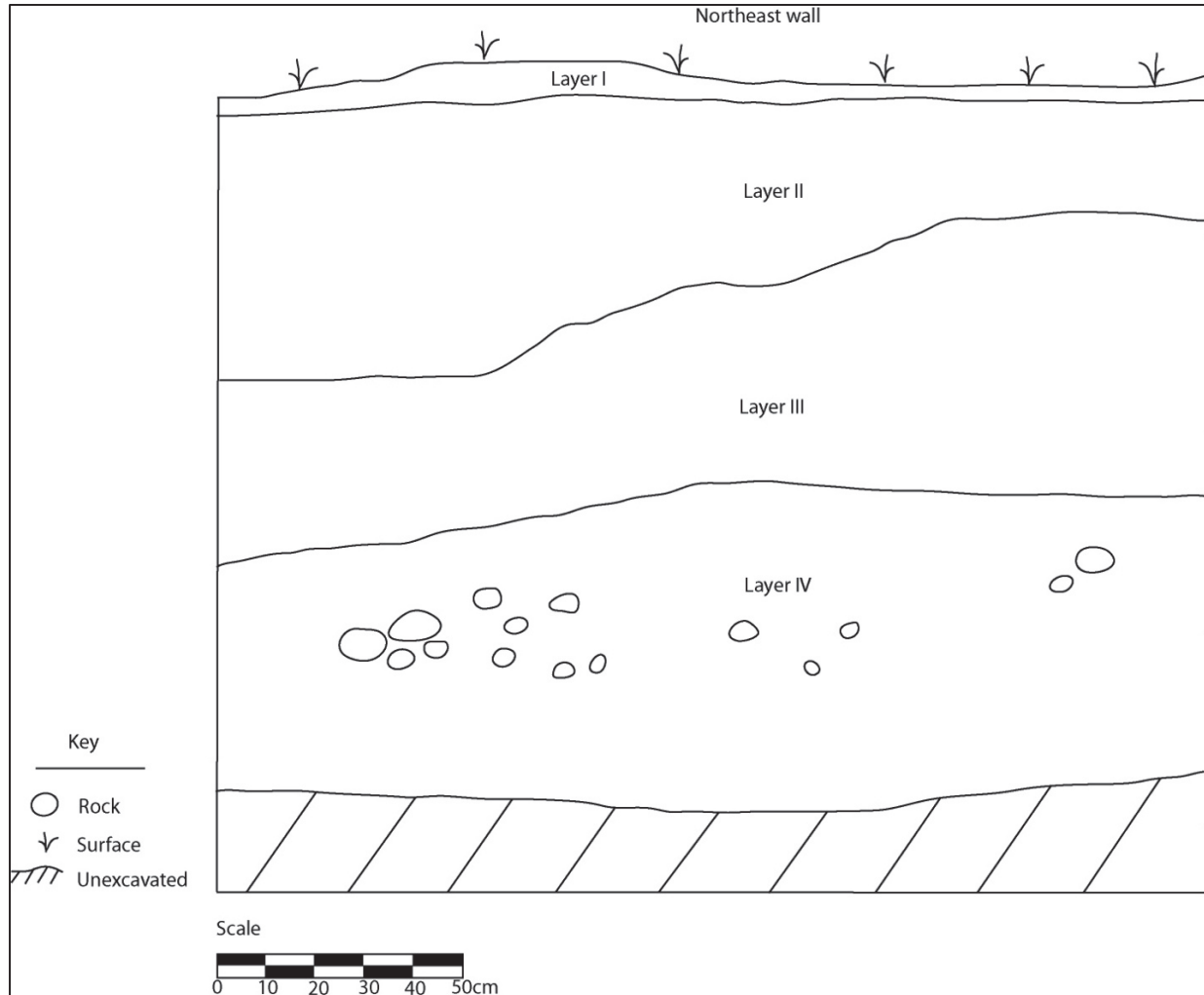
Layer	Depth	Description
Layer I	0-8 cmbs (4 cm)	Dark reddish brown (5 YR 3/3) silty clay loam; moderate, medium, crumb; friable, sticky, plastic; abrupt smooth boundary. Contains grass and recent organic material.
Layer II	2-32 cmbs (26 cm)	Strong brown (7.5 YR 4/6) with dark reddish brown (5 YR 3/3) sandy loam with silty clay loam; weak, fine, granular with moderate, medium, crumb; friable slightly sticky, slightly plastic with friable, sticky, plastic; abrupt smooth boundary. Mottled.
Layer III	16-116 cmbs (100 cm)	Dark red (2.5 YR 3/6) silty clay; moderate, medium, crumb; friable, very sticky, very plastic; abrupt smooth boundary.
Layer IV	112-135 cmbs (22 cm)	Dusky red (10YR 3/4) silty clay with decomposing basalt rock; moderate, coarse, crumb; friable, very sticky, very plastic. Contains decomposing basalt rock.

Trench 15

Trench 15 is located in the northwestern portion of the project area, on DOA land, c. 20 meters S/W of Kamehameha Highway and c. 5 meters N/W of DOA road (Figure 19). Trench 15 is situated in a previously cleared area that is now overgrown with grass. Trench 15 is oriented N/W-S/E (300°-120°) and measures c. 3.6 meters in length (N/W-S/E) by 0.60-0.70 meters in width (N/E-S/W) by 1.51 meters in depth. Trench 15 consists of Layer I, Layer II, Layer III, Layer IV.



Trench 15, northeast wall.



Trench 15, northeast wall profile.

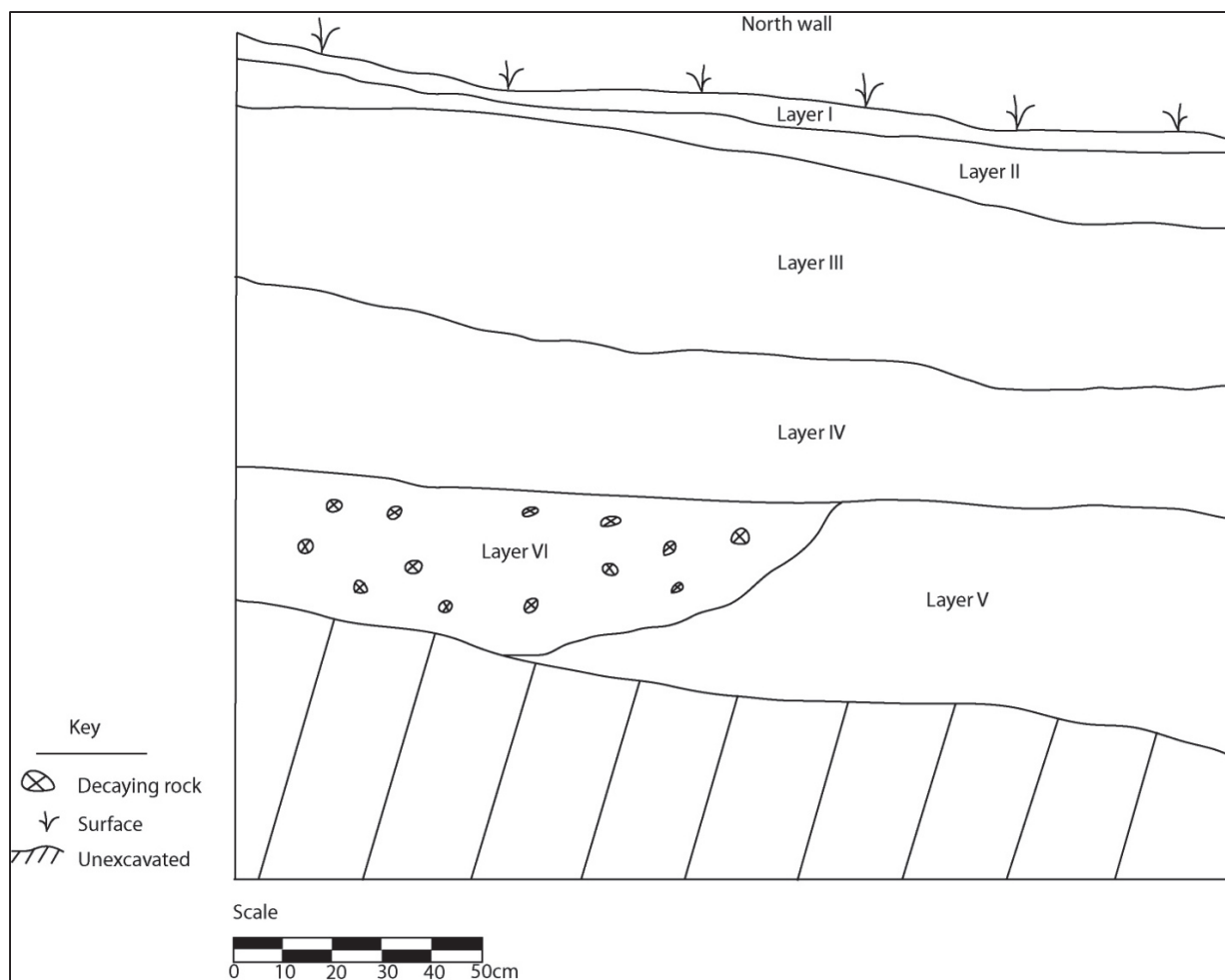
Layer	Depth	Description
Layer I	0-12 cmbs (10 cm)	Very dark brown (7.5 YR 2.5/3) silty clay; strong, fine, subangular blocky; firm, sticky, plastic; abrupt smooth boundary. Contains grass and recent organic material. Also contains modern rubbish. Also contains fragments of charcoal.
Layer II	10-65 cmbs (57 cm)	Dark brown (7.5 YR 3/3) silty clay; moderate, medium, subangular blocky; firm, very sticky, very plastic; abrupt wavy boundary.
Layer III	30-103 cmbs (57 cm)	Dark brown (7.5 YR 3/3) silty clay; weak, medium, platy; firm, very sticky, very plastic; abrupt smooth boundary.
Layer IV	85-151 cmbs (65 cm)	Dark brown (7.5 YR 3/4) silty clay; moderate, medium, subangular blocky; friable, very sticky, very plastic. Contains roughly waterworn basalt cobbles and pebbles.

Trench 16

Trench 16 is located in the western portion of the project area, within the proposed access road to Pad/Turbine #1 (Figure 19). Trench 16 is situated on a previously cleared E/W dirt access road leading to a MET tower, east of Pad/Turbine #1. Trench 16 is oriented E/W (100°-280°) and measures c. 4 meters in length (E/W) by 0.70-1.2 meters in width (N/S) by 1.45 meters in depth. Trench 16 consists of Layer I, Layer II, Layer III, Layer IV, Layer v, Layer VI.



Trench 16, north wall.



Trench 16, north wall profile.

Layer	Depth	Description
Layer I	0-22 cmbs (2 cm)	Dark yellowish brown (10 YR 3/6) loam; moderate, medium, crumb; firm, slightly sticky, slightly plastic; abrupt smooth boundary. Contains grass and recent organic material.
Layer II	3-40 cmbs (18 cm)	Dark yellowish brown (10YR 3/6) loam; moderate, medium, crumb; firm, slightly sticky, slightly plastic; abrupt smooth boundary.
Layer III	16-70 cmbs (55 cm)	Very dark brown (10 YR 2/2) silty clay; moderate, fine, crumb; friable, very sticky, very plastic; abrupt smooth boundary. Contains basalt boulders and cobbles.
Layer IV	50-96 cmbs (37 cm)	Dark brown (10 YR 3/3) silty clay; moderate fine, crumb; friable, very sticky, very plastic; abrupt smooth boundary. Contains basalt boulders and cobbles.
Layer V	96-145 cmbs (50 cm)	Dark brown (10 YR 3/3) silty clay; moderate, thick, platy; friable, very sticky, very plastic
Layer VI	88-126 cmbs (35 cm)	Dark gray (2.5 Y 4/1) with yellowish red (5 YR 4/6) silty clay; moderate, coarse, subangular blocky; friable, very sticky, very plastic. Mottled. Contains decaying basalt rocks.

APPENDIX D

WOOD IDENTIFICATION

**RADIOCARBON SAMPLE SCREENING FOR THE
NA PUA MAKANI ARCHAEOLOGICAL INVENTORY SURVEY,
PACIFIC LEGACY PROJECT 2780.04, KAHUKU, O'AHU**

Gail M. Murakami
International Archaeological Research Institute, Inc.

January 7, 2015

INTRODUCTION

This report presents the results of taxa identification in charcoal samples from Pacific Legacy's Na Pua Makani Archaeological Inventory Survey (AIS) Project 2780.04 on O'ahu Island. Identification of charcoal found in archaeological context can give insight into the vegetation of the surrounding area at the time that the woods were burned. This information can then be used to interpret the environment as well as possible cultural use of specific plants. In this way charcoal samples may be viewed as partial records of the environmental and cultural history of an area.

METHODS

The freshly fractured transverse and tangential facets of the charcoal pieces were viewed under magnification of a dissecting microscope. Taxa identifications were made by comparing the anatomical characteristics seen during examination against those of known woods in the Pacific Islands Wood Collection at the Department of Botany, University of Hawai'i, and published descriptions.

RESULTS

Two charcoal samples collected from a small shelter during the Na Pua Makani project were examined for taxa identification. One taxon was identified in each of the samples, totaling two taxa for the assemblage. The results are summarized in Table 1. Descriptions of the taxa identified are presented in the review below.

Table 1. Charcoal Taxa Identification in Samples from the Na Pua Makani Project, O'ahu Island.

WIDL #	Taxa	Common/ Hawaiian Name	Origin/Habit	Part	Count	Weight, g
Bag 11, T-72, TU 1, Layer I/Level 2, Sample #1						
1426-1	<i>Chamaesyce</i> sp.	<i>'Akoko</i>	Native/Shrub	Wood	1	0.07
Bag 28, T-72, TU 1, 37 cm bd, west wall post-ex, Sample #3						
1426-2	<i>Hibiscus tiliaceus</i>	<i>Hau</i>	Native/Shrub-Tree	Wood	3	0.09

TAXA REVIEW

Chamaesyce spp. ('Akoko)

The distribution of the 15 endemic shrubs and small trees in this genus range from coastal environments to upper forest zones on the main Hawaiian Islands. Nine of these native species are found on O'ahu (Wagner et al. 1990:602-617; Rock 1974:243-262). 'Akoko was once valued for firewood by the Hawaiians (Hillebrand 1981:396). The milky sap was once considered a possible source for rubber (Rock 1974:261).

Hibiscus tiliaceus L. (Hau)

This indigenous plant is described by Handy and Handy (1972:232-233) as a "large-leaved shrublike tree" which was planted near houses and gardens. The straight-stemmed variety was once planted for bast fibers from which cords, ropes, and coarse *tapa* cloth were made. Its soft wood was used to make canoe outriggers, fishnet floats, and fire by rubbing a harder wood against it. The creeping variety was used for windbreaks. This species occurs primarily along coasts, streams, and other wet areas up to 1,220 m in elevation on all main islands although not documented from Ni'ihau and Kaho'olawe (Wagner et al. 1990:888).

REFERENCES CITED

Handy, E. S. Craighill and Elizabeth G. Handy

- 1972 *Native Planters of Old Hawaii: Their Life, Lore, and Environment*. Bishop Museum Bulletin 233. Bishop Museum Press, Honolulu.

Hillebrand, William

- 1981 *Flora of the Hawaiian Islands: A Description of their Phanerogams and Vascular Cryptogams*. Lubrecht & Cramer, New York. Originally published in 1888.

Rock, Joseph F.

- 1974 *The Indigenous Trees of the Hawaiian Islands*. Charles E. Tuttle Company, Inc.

Wagner, Warren L., Derral R. Herbst, and S. H. Sohmer

- 1990 *Manual of the Flowering Plants of Hawai'i*. University of Hawaii and Bishop Museum Presses, Honolulu.

APPENDIX E

RADIOCARBON DATING RESULTS



*Consistent Accuracy . . .
... Delivered On-time*

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Miami, Florida 33155 USA
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www.radiocarbon.com

Darden Hood
President

Ronald Hatfield
Christopher Patrick
Deputy Directors

February 5, 2015

Dr. Paul Cleghorn
Pacific Legacy, Incorporated
30 Aulike Street, #301
Kailua, HI 96734
USA

RE: Radiocarbon Dating Results For Samples NPM T72 CH3, NPM T72 CH1

Dear Dr. Cleghorn:

Enclosed are the radiocarbon dating results for two samples recently sent to us. As usual, the method of analysis is listed on the report with the results and calibration data is provided where applicable. The Conventional Radiocarbon Ages have all been corrected for total fractionation effects and where applicable, calibration was performed using 2013 calibration databases (cited on the graph pages).

The web directory containing the table of results and PDF download also contains pictures, a cvs spreadsheet download option and a quality assurance report containing expected vs. measured values for 3-5 working standards analyzed simultaneously with your samples.

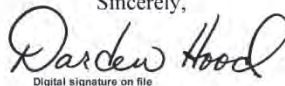
Reported results are accredited to ISO/IEC 17025:2005 Testing Accreditation PJLA #59423 standards and all chemistry was performed here in our laboratories and counted in our own accelerators here in Miami. Since Beta is not a teaching laboratory, only graduates trained to strict protocols of the ISO/IEC 17025:2005 Testing Accreditation PJLA #59423 program participated in the analyses.

As always Conventional Radiocarbon Ages and sigmas are rounded to the nearest 10 years per the conventions of the 1977 International Radiocarbon Conference. When counting statistics produce sigmas lower than ± 30 years, a conservative ± 30 BP is cited for the result.

When interpreting the results, please consider any communications you may have had with us regarding the samples. As always, your inquiries are most welcome. If you have any questions or would like further details of the analyses, please do not hesitate to contact us.

The cost of the analysis was charged to the VISA card provided. Thank you. As always, if you have any questions or would like to discuss the results, don't hesitate to contact me.

Sincerely,


Digital signature on file

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**BETA ANALYTIC INC.**

DR. M.A. TAMERS and MR. D.G. HOOD

4985 S.W. 74 COURT
MIAMI, FLORIDA, USA 33155
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REPORT OF RADIOCARBON DATING ANALYSES

Dr. Paul Cleghorn

Report Date: 2/5/2015

Pacific Legacy, Incorporated

Material Received: 1/23/2015

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 402614 SAMPLE : NPM T72 CH3 ANALYSIS : AMS-Standard delivery MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid 2 SIGMA CALIBRATION : Cal AD 1680 to 1765 (Cal BP 270 to 185) and Cal AD 1800 to 1940 (Cal BP 150 to 10) and Post AD 1950 (Post BP 0)	100 +/- 30 BP	-24.2 o/oo	110 +/- 30 BP
Beta - 402615 SAMPLE : NPM T72 CH1 ANALYSIS : AMS-Standard delivery MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid 2 SIGMA CALIBRATION : Cal AD 1655 to 1695 (Cal BP 295 to 255) and Cal AD 1725 to 1815 (Cal BP 225 to 135) and Cal AD 1835 to 1840 (Cal BP 115 to 110) and Cal AD 1855 to 1865 (Cal BP 95 to 85) and Cal AD 1920 to Post 1950 (Cal BP 30 to Post 0)	100.7 +/- 0.4 pMC	-10.3 o/oo	180 +/- 30 BP

Dates are reported as RCYBP (radiocarbon years before present, "present" = AD 1950). By international convention, the modern reference standard was 95% the 14C activity of the National Institute of Standards and Technology (NIST) Oxalic Acid (SRM 4990C) and calculated using the Libby 14C half-life (5568 years). Quoted errors represent 1 relative standard deviation statistics (68% probability) counting errors based on the combined measurements of the sample, background, and modern reference standards. Measured 13C/12C ratios (delta 13C) were calculated relative to the PDB-1 standard.

The Conventional Radiocarbon Age represents the Measured Radiocarbon Age corrected for isotopic fractionation, calculated using the delta 13C. On rare occasion where the Conventional Radiocarbon Age was calculated using an assumed delta 13C, the ratio and the Conventional Radiocarbon Age will be followed by ***. The Conventional Radiocarbon Age is not calendar calibrated. When available, the Calendar Calibrated result is calculated from the Conventional Radiocarbon Age and is listed as the "Two Sigma Calibrated Result" for each sample.

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12 = -24,2 ‰ ; lab. mult = 1)

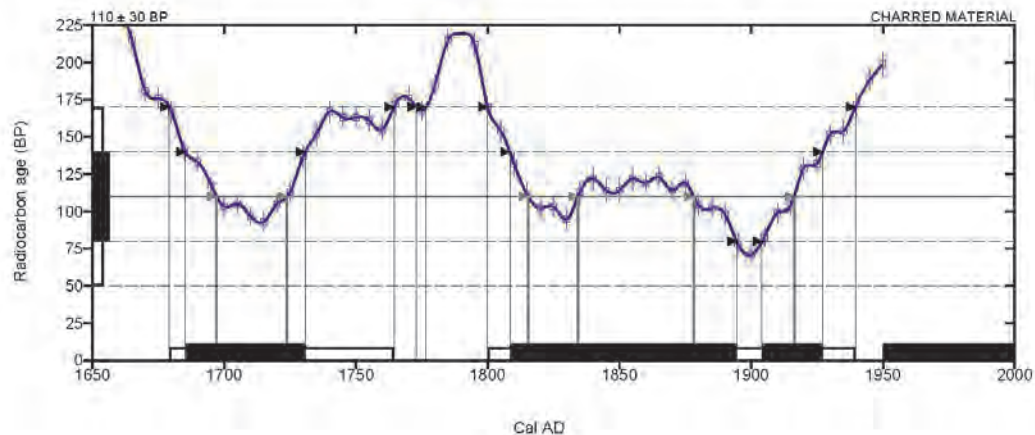
Laboratory number Beta-402614

Conventional radiocarbon age 110 ± 30 BP

Calibrated Result (95% Probability) Cal AD 1680 to 1765 (Cal BP 270 to 185)
Cal AD 1800 to 1940 (Cal BP 150 to 10)
Post AD 1950 (Post BP 0)

Intercept of radiocarbon age with calibration curve
Cal AD 1695 (Cal BP 255)
Cal AD 1725 (Cal BP 225)
Cal AD 1815 (Cal BP 135)
Cal AD 1835 (Cal BP 115)
Cal AD 1880 (Cal BP 70)
Cal AD 1915 (Cal BP 35)
Post AD 1950 (Post BP 0)

Calibrated Result (68% Probability) Cal AD 1685 to 1730 (Cal BP 265 to 220)
Cal AD 1810 to 1895 (Cal BP 140 to 55)
Cal AD 1905 to 1925 (Cal BP 45 to 25)
Post AD 1950 (Post BP 0)



Database used
INTCAL13

References

Mathematics used for calibration scenario

A Simplified Approach to Calibrating ^{14}C Dates, Telford, A. S., Vogel, J. C., 1993, Radiocarbon 35(2):317-322

References to INTCAL13 database

Reimer PJ et al. IntCal13 and Marine13 radiocarbon age calibration curves 0–50,000 years cal BP. Radiocarbon 55(4):1869–1887, 2013.

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12 = -10.3 ‰ ; lab. mult = 1)

Laboratory number Beta-402615

Conventional radiocarbon age 180 ± 30 BP

2 Sigma calibrated result
95% probability

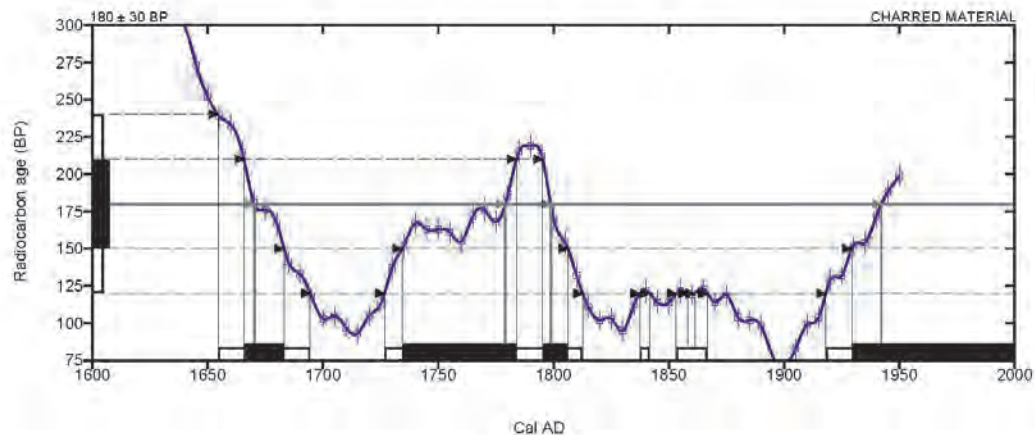
Cal AD 1655 to 1695 (Cal BP 295 to 255)
Cal AD 1725 to 1815 (Cal BP 225 to 135)
Cal AD 1835 to 1840 (Cal BP 115 to 110)
Cal AD 1855 to 1865 (Cal BP 95 to 85)
Cal AD 1920 to Post 1950 (Cal BP 30 to Post 0)

Intercept of radiocarbon age with calibration curve

Cal AD 1670 (Cal BP 280)
Cal AD 1780 (Cal BP 170)
Cal AD 1800 (Cal BP 150)
Cal AD 1940 (Cal BP 10)
Post AD 1950 (Post BP 0)

1 Sigma calibrated results
68% probability

Cal AD 1665 to 1685 (Cal BP 285 to 265)
Cal AD 1735 to 1785 (Cal BP 215 to 165)
Cal AD 1795 to 1805 (Cal BP 155 to 145)
Cal AD 1930 to Post 1950 (Cal BP 20 to Post 0)



Database used
INTCAL13

References

Mathematics used for calibration scenario

A Simplified Approach to Calibrating ^{14}C Dates, Telford, A. S., Yegor, J. C., 1993, Radiocarbon 35(2):317-322.

References to INTCAL13 database

Reimer PJ et al. IntCal13 and Marine13 radiocarbon age calibration curves 0–50,000 years cal BP. Radiocarbon 55(4):1869–1887, 2013.

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